Association Between Maternal Feeding Practices and Symptoms of Anxiety and Depression Among 6-Year-Old Children

Shannon Flahive[1], Bhakti Chavan[2] and Zelalem T Haile[2] (ID)

[1]Heritage College of Osteopathic Medicine, Ohio University, Dublin, OH, USA.
[2]Department of Social Medicine, Heritage College of Osteopathic Medicine, Ohio University, Dublin, OH, USA.

ABSTRACT

BACKGROUND: Maternal feeding practices (MFPs) have been linked to childhood obesity and other eating disorders. However, population-based research examining the association between MFPs and children's emotional well-being is currently lacking.

METHODS: We examined 1241 participants from Year 6 Follow-Up of the Infant Feeding Practices Study II, conducted from March to June 2012 in the United States.

RESULTS: Approximately 57.5% and 47.8% of participants reported at least one symptom of childhood anxiety and depression, respectively. After adjusting for potential confounders, mothers who responded "yes" to "If I did not guide or regulate my child's eating, he or she would eat too much of his or her favorite food" had higher odds of having a child who has symptoms of depression and anxiety compared with mothers who responded "no" (odds ratio [OR], 95% confidence interval [CI]) (2.02; 1.47-2.78, $P < .001$) and (1.41, 1.05-1.91, $P = .024$), respectively. The odds of having a child who has symptoms of depression were lower among mothers who responded "yes" to "I make sure that my child does not eat too many sweets or junk foods" compared with mothers who responded "no" (0.49; 0.26-0.91, $P = .020$). Mothers who responded "yes" to "I encourage my 6 year-old to eat all of the food on his or her plate" had higher odds of having a child who has symptoms of anxiety compared with mothers who responded "no" (1.43; 1.01-2.05, $P = .049$).

CONCLUSIONS: Controlling MFPs may influence a child's emotional well-being. Further research is needed to address the complex relationships between MFPs and psychosocial well-being in children.

KEYWORDS: Maternal feeding practices, symptoms of anxiety, symptoms of depression, Infant Feeding Practices Study II, Year 6 Follow-Up

Introduction

Early childhood is a critical timeline for child development, and parenting style is one of the most influential factors.[1] One of the significant predictors of childhood obesity is maternal feeding practice (MFP).[2] MFP can influence child's eating behavior, which may possibly affect emotional well-being and long-term childhood development. Mothers who have controlling MFPs and impose "pressure to eat" and "restrictive" practices are more likely to have an overweight child.[2] Mothers who practice "pressure to eat" are more likely to encourage their child empty their bottles during infancy and may continue have similar influence on children's eating patterns.[3] However, mothers with "restrictive" MFPs impose "keeping foods out of reach or placing constraints on when and how much food may be consumed" practices.[4] Among young girls, restrictive MFP is associated with higher body mass indices (BMIs) and a higher probability of eating excessively in the absence of hunger.[4]

The prevalence of overweight and obesity, mental health disorders, specifically generalized anxiety disorder (GAD), and depression is increasing among children.[5,6] GAD, depression, and childhood obesity are associated with eating disorders (ED), including binge-eating disorder (BED), anorexia nervosa (AN), and bulimia nervosa (BN).[7] Dysregulated eating behavior results in one who is no longer able to understand hunger and satiety cues.[8] In children, eating pattern and development is a multifactorial system that encompasses genetic and complex neurobiological pathways and environmental, sociocultural, and psychological influences.[9]

In light of the rising prevalence of depression and anxiety problems among children, identification of modifiable risk factor is critical. To our knowledge, there are no published studies examining the association between MFPs and child's emotional well-being. In this context, we examined the association between MFPs through "pressure to eat," "restriction," and child's emotional well-being. We hypothesized that MFPs would be associated with the presence of symptoms of anxiety and depression in children. We further hypothesized that certain maternal and child characteristics would moderate the association between MFPs and the presence of symptoms of anxiety and depression.

Methods

Study participants and procedures

This study used data from the Year 6 Follow-Up (Y6FU) of the Infant Feeding Practices Study II (IFPS II). A detailed description of the IFPS II and its Y6FU can be found elsewhere.[10] In brief, IFPS II is a longitudinal survey conducted from May 2005 to June 2007 by the Centers for Disease Control and Prevention (CDC) and the US Food and Drug Administration. Nearly 2000 mothers were followed from the last trimester through the first year postpartum to collect data using a structured questionnaire that was mailed at ~1, 2, 3, 4, 5, 6, 7, 9, 10.5, and 12 months after birth. The Y6FU is a cross-sectional mail survey conducted between March and June of 2012 when the children were 6 years old. Of the 2000 mothers who were followed through the first year postpartum, only 1542 completed the Y6FU questionnaire, for a response rate of 77.1%.[11,12] The Y6FU questionnaire covered several topics including childcare and characteristics, child's current health status, diet, physical activity, screen time, dental health, maternal characteristics including feeding practices, and family medical history. We excluded participants with missing data (n = 301) for MFPs, anxiety, depression, or other covariates adjusted in the multivariable model. The final analytic sample consisted of 1241 participants. Data collection procedures for Y6FU of the IFPS II were approved by the United States Food and Drug Administration Institutional Review Board. In addition, ethical clearance for this study was obtained from the Institutional Review Board of the authors' institution (Number: 16-E-257).

Main outcomes: symptoms of depression and anxiety

The main outcome variable was the child's depressive and anxiety symptoms defined based on the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM*-V) criteria for diagnosis of depression and anxiety.[13] As part of the Y6FU, mothers were asked to respond to 25 items related to children's psychosocial development during the previous 6 months. These items were derived from a widely used and previously validated instrument, the Strengths and Difficulties Questionnaire (SDQ).[14] A detailed description and application of this instrument to screen for child psychiatric disorders can be found elsewhere.[15] Each item was scored as 0 = not true, 1 = somewhat true, or 2 = certainly true. First, items that correspond to the *DSM*-V criteria were selected and classified either as symptom of depression or anxiety. Items that did not correspond to the *DSM*-V criteria for symptom of depression or anxiety were excluded. Items used to define the presence of "depressive symptoms" variable includes "Often loses temper," "Often fights with other children or bullies them," and "Is often unhappy, depressed, or tearful." Items used to classify the presence of "anxiety symptoms" variable includes "Has many worries, or often seems worried," "Is nervous or clingy in new situations," and "Has many fears, or is easily scared." Next, the responses to these items were dichotomized into "yes" (combining "somewhat true" and "certainly true") and "no" ("not true"). A child was considered to have symptoms of depression and anxiety if at least one symptom was present for the respective variable.

Exposure measurements: MFPs

The Y6FU includes four items that were adapted from a previously validated instrument, the Child Feeding Questionnaire (CFQ).[3,16] Child Feeding Questionnaire was designed to assess maternal attitudes, beliefs, and practices toward the child's weight and feeding practices. In this context, maternal responses to these 4 items measured using a 5-point Likert-type scale were used to characterize MFPs. Items related to restrictive MFPs include "I make sure that my child does not eat too many sweets or junk foods" and "If I did not guide or regulate my child's eating, he or she would eat too much of his or her favorite food." Items related to pressure to eat MFPs include "How often do you encourage your 6 year-old to eat all of the food on his or her plate?" and "I am especially careful to make sure my child eats enough." The responses to these items were dichotomized into "yes" (4 and 5 on the scale) and "no" (1, 2, and 3 on the scale) with "yes" indicating a high level of maternal control either by pressuring to eat or restricting food.[3]

Covariates

To control for potential confounding variables, we examined other maternal and child's characteristics as well as family history-related variables. Maternal characteristics examined in this study include age, marital status, poverty-income ratio (%), education, employment status, race/ethnicity, prepregnancy BMI, and postpartum participation in the Special Supplemental Nutrition Program (SNAP). Characteristics of the child assessed include sex, birth weight, BMI, physical activity, and receipt of special services at school. Child's BMI was determined based on CDC growth charts for boys and girls at year 6.[17] Family history variables examined include family history of overweight or obesity, depression, and anxiety.

Statistical analysis

Descriptive analysis was performed to summarize and describe the data. We first examined bivariate associations between MFPs and the presence of symptoms of anxiety in children using Chi-square test (χ^2). We then constructed separate multivariable logistic regression analysis to determine the independent association between MFPs and the presence of symptoms of anxiety and depression after adjusting for potential confounders. Maternal age, marital status, poverty-income ratio (%), SNAP, employment, and race/ethnicity as well as child's BMI, special services, and physical activity were included as covariates in the

multivariable model, regardless of their statistical significance in the bivariate analyses.[6,18–21] The models included pairwise interactions between MFPs and each covariate adjusted in the multivariable model to examine differences in the magnitude of association between MFPs and the presence of anxiety and depressive symptoms across different levels of covariates. None of the interaction terms was significant and main effect models were fitted. We assessed the presence of potential multicollinearity by examining variance inflation factor (VIF). Using a conservative threshold value of 4 for VIF, we found no collinearity. Model fit was evaluated using Hosmer-Lemeshow goodness-of-fit χ^2 estimates. For each multivariable regression model, the Hosmer-Lemeshow goodness-of-fit test was not significant. Odds ratios (ORs), the 95% confidence intervals (CIs) for ORs, and *P* values were calculated. *P* values were 2-sided and statistical significance was set at alpha = 0.05. All analyses were conducted using SAS 9.4 (SAS institute, Cary, NC).

Results

Table 1 shows the characteristics of the study population. Of the 1241 women respondents, 65.3% were 35 years or older, 50.4% gave birth to a boy, 86.2% were married or in a domestic partnership, 38.6% were in the 185%-349% poverty-income category, 49.3% were college educated or beyond, 62.2% were employed, 87.2% were non-Hispanic white, 83.6% were not receiving supplemental nutrition assistance program, and 40.2% had normal BMI. For MFPs, 95.6% reported "yes" to "I make sure that my child does not eat too many sweets or junk foods" and 81.7% reported "yes" to "If I did not guide or regulate my child's eating, he or she would eat too much of his or her favorite foods." In pressure to eat MFP, 87.9% reported "yes" to "I am especially careful to make sure my child eats enough" and 86.2% reported "yes" to "encourage your 6 year old to eat all of the food on his or her plate."

Results of the bivariate association between MFPs and the presence of symptoms of anxiety and depression in children are shown in Table 2. Mothers who responded "yes" to restrictive MFPs were more likely to report symptoms of anxiety in children compared with those who answered "no." In addition, mothers who responded "yes" to restrictive MFP were more likely to report symptoms of depression in children compared with those who answered "no." We were unable to detect significant differences in the proportions of the symptoms of anxiety and depression by "pressure to eat" MFPs.

The crude and multivariable-adjusted OR for the association between MFPs and the presence of symptoms of depression are shown in Table 3. After adjusting for confounders, mothers who answered "yes" to "encourage your 6 year old to eat all of the food on his or her plate" had higher odds of having a child who has symptoms of depression compared with those who answered "no" (OR; 95% CI) (1.43; 1.01-2.05; *P* = .049). Mothers who answered "yes" to the restrictive MFP "If I did not guide or regulate my child's eating, he or she would eat too much of his or her favorite foods" had higher odds having a

Table 1. Characteristics of the study sample (n = 1241).

	N (%)
Maternal characteristics	
Maternal age (years)	
18-24	4 (0.3)
25-29	93 (7.5)
30-34	333 (26.8)
≥35	811 (65.4)
Marital status	
Married/living together	1070 (86.2)
Never married	69 (5.6)
Other	102 (8.2)
Poverty-income ratio (%)	
<185	436 (35.1)
185-349	479 (38.6)
≥350	326 (26.3)
Mother's education	
High school or less	156 (12.6)
Some college	473 (38.1)
College graduate	612 (49.3)
Employment	
Unemployed	469 (37.8)
Employed	772 (62.2)
Race/ethnicity	
Non-Hispanic white	1082 (87.2)
Non-Hispanic black	49 (4.0)
Hispanic	61 (4.9)
Other	49 (3.9)
Prepregnancy body mass index	
Underweight	44 (3.6)
Normal	499 (40.2)
Overweight	329 (26.5)
Obese	369 (29.7)
Received supplemental nutrition assistance program	
No	1037 (83.6)
Yes	204 (16.4)
Child's characteristics	
Sex	
Male	625 (50.4)
Female	616 (49.6)

(Continued)

Table 1. (Continued)

	N (%)
Birth weight	
<2500 g	22 (1.8)
2500-3999 g	1065 (85.8)
≥4000 g	154 (12.4)
Body mass index	
Underweight	187 (15.1)
Normal	758 (61.1)
Overweight	137 (11.0)
Obese	159 (12.8)
Physical activity	
No	804 (64.8)
Yes	437 (35.2)
Received special services at school	
No	946 (76.2)
Yes	295 (23.8)
Has symptoms of depression	
No	648 (52.2)
Yes	593 (47.8)
Has symptoms of anxiety	
No	528 (42.5)
Yes	713 (57.5)
Family history	
Any family member is overweight or obese	
No	427 (34.4)
Yes	814 (65.6)
Any family member has depression	
No	818 (65.9)
Yes	423 (34.1)
Any family member has anxiety	
No	939 (75.7)
Yes	302 (24.3)
Maternal feeding practices	
I am especially careful that my child eats enough	
No	150 (12.1)
Yes	1091 (87.9)
I encourage my child to eat all food on the plate	
No	171 (13.8)
Yes	1070 (86.2)

Table 1. (Continued)

	N (%)
I make sure my child doesn't eat too many sweets or junk food	
No	54 (4.5)
Yes	1187 (95.5)
If I didn't guide/regulate my child would eat too much of his or her favorite food	
No	227 (18.3)
Yes	1014 (81.7)

Physical activity was defined by whether or not a 6-year-old child spends at least 60 minutes per day in any kind of physical activity that makes him or her sweat or breathe hard. Receipt of special services at school was defined by whether or not a 6-year-old child received at least one of the following services: speech or language therapy; occupational therapy or other type of therapy for help with handwriting or other motor skills; special instruction or help in one or more school subjects such as reading or math; special services because of a problem with vision or hearing; and psychological services or counseling because of a problem with emotions, behavior, or socialization, behavioral support, such as a behavior management plan or individual support in the classroom by an assistant.

child who has symptoms depression compared with mothers who responded "no" (2.02; 1.47-2.78; *P* < .001). Mothers who answered "yes" to the other restrictive MFP "I make sure that my child does not eat many sweets or junk foods" had lower odds of having a child who has symptoms of depression compared with mothers who responded "no" (0.49; 0.26-0.91; *P* = .020). Table 4 displays the crude and multivariable-adjusted likelihood of having a child who has symptoms of anxiety by MFPs. After adjusting for potential confounders, mothers who responded "yes" to the restrictive MFP "If I did not guide or regulate my child's eating, he or she would eat too much of his or her favorite foods" had higher odds of having a child who has symptoms of anxiety compared with mothers who answered "no" (1.41; 1.05-1.91; *P* = .024).

Discussion

The principal finding of this study is that "restrictive" MFP was positively associated with the presence of symptoms of anxiety and depression symptoms in children. "Pressure to eat" MFP was positively associated with the presence of symptoms of depression in children. This finding is important because parental practices in the realm of eating and feeding behavior may play a role in the development of symptoms of anxiety and depression in children. However, given the relatively large sample and small effect size, the observed association should be viewed with caution.

Children's anxiety and depressive symptoms are known to be multifactorial, including both biological and environmental causes.[18,19] In general, it has been shown that restrained eating can lead to ED and/or higher BMIs.[4,7] In the context of Western society, there is pressure to be thin and fear of becoming part of the obesity epidemic. In turn, our society is

Table 2. Characteristics of the study sample by the presence of symptoms of depression and anxiety at 6 years of age.

	SYMPTOMS OF ANXIETY			SYMPTOMS OF DEPRESSION		
	NO	YES		NO	YES	
	N (%)	N (%)	*P*	N (%)	N (%)	*P*
Maternal characteristics						
Maternal age (years)			.271			.877
18-24	1 (25.0)	3 (75.0)		2 (50.0)	2 (50.0)	
25-29	32 (34.4)	61 (65.6)		46 (49.5)	47 (50.5)	
30-34	138 (41.4)	195 (58.6)		170 (51.1)	163 (48.9)	
≥35	357 (44.0)	454 (56.0)		430 (53.0)	381 (47.0)	
Marital status			.824			.174
Married/living together	454 (42.4)	616 (57.6)		570 (53.3)	500 (46.7)	
Never married	28 (40.6)	41 (59.4)		32 (46.4)	37 (53.6)	
Other	46 (45.1)	56 (54.9)		46 (45.1)	56 (54.9)	
Poverty-income ratio (%)			.489			.011
<185	189 (43.5)	247 (56.5)		203 (46.6)	233 (53.4)	
185-349	194 (40.5)	285 (59.5)		260 (54.3)	219 (45.7)	
≥350	145 (44.5)	181 (55.5)		185 (56.8)	141 (43.2)	
Mother's education			.756			.048
High school or less	67 (42.5)	89 (57.5)		78 (50.0)	78 (50.0)	
Some college	195 (41.2)	278 (58.8)		229 (48.4)	244 (51.6)	
College graduate	266 (43.5)	346 (56.5)		341 (55.7)	271 (44.3)	
Employment			.172			.648
Unemployed	188 (40.1)	281 (59.9)		241 (51.4)	228 (48.6)	
Employed	340 (44.0)	432 (56.0)		407 (52.7)	365 (47.3)	
Race/ethnicity			.398			.432
Non-Hispanic white	459 (42.4)	623 (57.6)		563 (52.0)	519 (48.0)	
Non-Hispanic black	26 (53.1)	23 (46.9)		30 (61.2)	19 (38.8)	
Hispanic	25 (41.0)	36 (59.0)		28 (45.9)	33 (54.1)	
Other	18 (36.7)	31 (63.3)		27 (55.1)	22 (44.9)	
Prepregnancy body mass index			.583			.011
Underweight	17 (38.6)	27 (61.4)		19 (43.2)	25 (56.8)	
Normal	204 (40.9)	295 (59.1)		288 (57.7)	211 (42.3)	
Overweight	140 (42.5)	189 (57.5)		165 (50.2)	164 (49.8)	
Obese	167 (45.3)	202 (54.7)		176 (47.7)	193 (52.3)	
Received supplemental nutrition assistance program			.557			.077
No	445 (42.9)	592 (57.1)		553 (53.3)	484 (46.7)	
Yes	83 (40.7)	121 (59.3)		95 (46.6)	109 (53.4)	

(Continued)

Table 2. (Continued)

	SYMPTOMS OF ANXIETY			SYMPTOMS OF DEPRESSION		
	NO	YES		NO	YES	
	N (%)	N (%)	*P*	N (%)	N (%)	*P*
Child's characteristics						
Sex			.001			.021
Male	294 (47.0)	331 (53.0)		306 (49.0)	319 (51.0)	
Female	234 (38.0)	382 (62.0)		342 (55.5)	274 (44.5)	
Birth weight			.894			.143
<2500 g	9 (40.9)	13 (59.1)		12 (54.5)	10 (45.5)	
2500-3999 g	456 (42.8)	609 (57.2)		567 (53.2)	498 (46.8)	
≥4000 g	63 (40.9)	91 (59.1)		69 (44.8)	85 (55.2)	
Body mass index			.441			.009
Underweight	75 (40.1)	112 (59.9)		103 (55.1)	84 (44.9)	
Normal	316 (41.7)	442 (58.3)		414 (54.6)	344 (45.4)	
Overweight	61 (44.5)	76 (55.5)		66 (48.2)	71 (51.8)	
Obese	76 (47.8)	83 (52.2)		65 (40.9)	94 (59.1)	
Physical activity			.332			.567
No	331 (41.5)	470 (58.5)		415 (51.6)	389 (48.4)	
Yes	194 (44.4)	243 (55.6)		233 (53.3)	204 (46.7)	
Received special services at school			.251			<.001
No	411 (43.5)	535 (56.5)		529 (55.9)	417 (44.1)	
Yes	117 (39.7)	178 (60.3)		119 (40.3)	176 (59.7)	
Family history						
Any family member is overweight or obese			.935			<.001
No	181 (42.4)	246 (57.6)		252 (59.0)	175 (41.0)	
Yes	347 (42.6)	467 (57.4)		396 (48.6)	418 (51.4)	
Any family member has depression			.091			<.001
No	362 (44.2)	456 (55.8)		463 (56.6)	355 (43.4)	
Yes	166 (39.2)	257 (60.8)		185 (43.7)	238 (56.3)	
Any family member has anxiety			.095			<.001
No	412 (43.8)	527 (56.1)		518 (55.2)	421 (44.8)	
Yes	116 (38.4)	186 (61.6)		130 (43.1)	172 (56.9)	
Maternal feeding practices						
I am especially careful that my child eats enough			.701			.451
No	66 (44.0)	84 (56.0)		74 (49.4)	76 (50.6)	
Yes	462 (42.5)	629 (57.5)		574 (52.6)	517 (47.4)	

Table 2. (Continued)

	SYMPTOMS OF ANXIETY			SYMPTOMS OF DEPRESSION		
	NO	YES		NO	YES	
	N (%)	N (%)	*P*	N (%)	N (%)	*P*
I encourage my child to eat all food on the plate			.646			.151
No	70 (40.9)	101 (59.1)		98 (57.3)	73 (42.7)	
Yes	458 (42.8)	612 (57.2)		550 (51.4)	520 (48.6)	
I make sure my child doesn't eat too many sweets or junk food			.093			.004
No	17 (31.5)	37 (68.5)		18 (33.3)	36 (66.7)	
Yes	511 (43.1)	676 (56.9)		630 (53.1)	557 (46.9)	
If I didn't guide/regulate my child would eat too much of his or her favorite food			.046			<.001
No	110 (48.5)	117 (51.5)		147 (64.8)	80 (35.2)	
Yes	418 (41.2)	596 (58.8)		501 (49.4)	513 (50.6)	

Table 3. Likelihood of having symptoms of depression at 6 years of age by maternal feeding practices.

MATERNAL FEEDING PRACTICES	CRUDE OR (95% CI)	*P*	ADJUSTED OR (95% CI)[A]	*P*
I am especially careful that my child eats enough				
No	Reference		Reference	
Yes	0.88 (0.62-1.23)	.451	0.84 (0.57-1.24)	.378
I encourage my child to eat all food on the plate				
No	Reference		Reference	
Yes	1.27 (0.92-1.76)	.152	1.43 (1.01-2.05)	.049
I make sure my child doesn't eat too many sweets or junk food				
No	Reference		Reference	
Yes	0.44 (0.25-0.77)	.006	0.49 (0.26-0.91)	.020
If I didn't guide/regulate my child would eat too much of his or her favorite food				
No	Reference		Reference	
Yes	1.88 (1.40-2.54)	<.001	2.02 (1.47-2.78)	<.001

Abbreviations: CI, confidence interval; OR, odds ratio.
[A]Adjusted for (1) maternal characteristics: age, marital status, poverty-income ratio (%), education, employment status, race/ethnicity, prepregnancy body mass index (BMI), postpartum participation in the Special Supplemental Nutrition Program (SNAP); (2) child's characteristics: sex, birth weight, BMI, physical activity, and receipt of special services at school; and (3) family history of overweight or obesity, depression, and anxiety.

surrounded by diets and a flourished industry of restriction. It has been shown that mothers who diet are more likely to have daughters who diet as well.[22,23] Parental modeling within the family food environment significantly affects young children's eating behavior especially during early years when a child forms attitudes and beliefs about food and eating.[22]

A study conducted in 1989 showed that 40% of parents believe that restricting or forbidding the consumption of a particular food would decrease their child's preference for that food, yet other studies have shown just the opposite.[24] For example, a study has shown that maternal restriction of access to certain foods led to the overconsumption of those foods.[25] Other studies have shown that highly controlling parenting feeding practices can lead to dysregulated eating and poor self-regulation in children 3-5 years of age.[26,27] The underlying plausible mechanism is a disruption in child's self-regulation

Table 4. Likelihood of having symptoms of anxiety at 6 years of age by maternal feeding practices.

MATERNAL FEEDING PRACTICES	CRUDE OR (95% CI)	P	ADJUSTED OR (95% CI)[A]	P
I am especially careful that my child eats enough				
No	Ref.		Ref.	
Yes	1.07 (0.76-1.51)	.700	1.01 (0.70-1.47)	.955
I encourage my child to eat all food on the plate				
No	Ref.		Ref.	
Yes	0.93 (0.67-1.29)	.648	0.87 (0.62-1.24)	.440
I make sure my child doesn't eat too many sweets or junk food				
No	Ref.		Ref.	
Yes	0.61 (0.34-1.09)	.096	0.56 (0.31-1.03)	.063
If I didn't guide/regulate my child would eat too much of his or her favorite food				
No	Ref.		Ref.	
Yes	1.34 (1.00-1.79)	.047	1.41 (1.05-1.91)	.024

Abbreviations: CI, confidence interval; OR, odds ratio.
[A]Adjusted for (1) maternal characteristics: age, marital status, poverty-income ratio (%), education, employment status, race/ethnicity, prepregnancy body mass index (BMI), postpartum participation in the Special Supplemental Nutrition Program (SNAP); (2) child's characteristics: sex, birth weight, BMI, physical activity, and receipt of special services at school; and (3) family history of overweight or obesity, depression, and anxiety.

mechanism resulting in an absence of hunger and weight gain.[28] Weight gain can negatively affect a child's emotional well-being, which can be manifested in the form of various depressive and anxiety symptoms. Thus, through its effect on child's eating behavior, MFP plays an important role in affecting a child's emotional well-being and the overall growth and development. Further research is needed to address the complex nature of the relationships between MFPs and psychosocial well-being in children.

In addition, our results showed that mothers of higher education status are more likely to engage in controlling MFPs, which is consistent with another study.[29] It has to be noted that only a small proportion of mothers who responded to Y6FU had high school or less education. Mothers who engage in more controlling MFPs are more likely to have children with dysregulated eating and/or anxiety/depressive symptoms.[29] Perhaps more research is needed to understand the underlying mechanism and identify potential interventions to prevent and treat dysregulated eating behaviors in children. Findings from this study can serve as a framework for future longitudinal studies examining causal mechanisms of the relationship between MFPs and childhood anxiety and depressive symptoms. It can also provide a platform in educating caregivers on providing a more healthful eating environment. One proposed philosophy that was developed to treat ED, end dieting, and help people lose weight is "intuitive eating."[30] This approach has been shown to be effective in treating BED.[31] Intuitive eating is eating based on physiological hunger and satiety cues and rarely for emotional reasons.[32] Intuitive eating, which was developed as philosophy toward adults, is consistent with a feeding paradigm developed by Satter, a dietician and social worker with experience in child-caregiver feeding dynamics, called the Trust Model.[33] The model emphasizes the division of feeding responsibility between the child and caregiver and trust in the child's ability to self-regulate food intake by recognizing hunger, appetite, and satiety cues within the context of regular eating habits.[34] According to this model, no type of food is restricted; however, the caregiver's responsibility is in developing the food environment. The caregivers trust their child's internal hunger, appetite, and satiety cues. However, the following behaviors can interfere with this trust and therefore lead to dysregulated eating in the child: misinterpretation of normal weight, restriction of food intake, pressures to eat when children refuse food, and using food as a calming agent.[34]

Using this approach, the caregiver will be responsible for covertly controlling the food environment in which the foods are made available and accessible to children, who are then responsible in determining what to eat, how much to eat, and when to stop eating. This model is consistent with our findings. Mothers who controlled the amount of sweets or junk food were less likely to have children with depressive symptoms. In a recent study, this type of covert control has been associated with lower BMI and healthy eating habits including increased fruit intake in children.[35] Future studies need to investigate whether or not mothers who engaged in this behavior are more likely to develop a healthy food environment. In this study, mothers who encouraged their child to finish their plate and who believed that if unregulated, their child would eat too many of his favorite foods were more likely to have a child with emotional symptoms. Further research is needed to identify

possible mechanism of the relationship between this type of MFP and emotional disruption.

The study has several limitations. The IFPS II and Y6FU study participants included women who volunteered to complete a mailed survey. This makes the study susceptible to selection bias and limits the generalizability of the study findings. In addition, the fact that mothers responded to all questions including their child's emotional symptomatology might have resulted in social desirability and misclassification biases. Finally, although the study adjusted for various potential confounders, residual confounding remains likely. However, the large sample size, our ability to adjust for many confounding variables, and the diversity among the child's emotional well-being are some of the study strengths.

This study demonstrated higher prevalence of symptoms of depression and anxiety in children born to mothers who engage in controlling MFPs. More effort is needed to explore the potential mechanisms through which MFP can affect childhood psychosocial behavior. Furthermore, additional research is needed to evaluate the efficacy of existing interventions aimed at preventing and treating dysregulated eating behavior. Primary care providers can play an essential role to inform parents and promote preventive lifestyle including optimal eating behavior and psychosocial well-being in children.

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Author Contributions

All authors contributed to the intellectual development of this paper. SF and ZTH had the original idea and drafted the manuscript. BC conducted data management and statistical analysis and assisted in drafting the manuscript. ZTH supervised the project including data analysis, made substantial contribution in interpretation of the data, and provided critical revision of manuscript. All authors have read and approved the final manuscript.

ORCID iD

Zelalem T Haile https://orcid.org/0000-0002-2912-8564

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