

Associations of Breastfeeding with Bulimic Behaviors and Eating Disorders among Adolescents

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ABSTRACT

Purpose: To use the lifecourse framework to examine the association between duration of breastfeeding and risk of developing bulimic behaviors or a diagnosed eating disorder.

Method: Questionnaires were sent every 12–24 months between 1996 and 2005 to 6,436 females and 5,756 males in the Growing Up Today Study, who were 9–14 years at baseline. Duration of breastfeeding was reported by the participants' mothers in 1997. We used generalized estimating equations to estimate the association of breastfeeding with purging, binge eating, engaging in bulimic behaviors, and having a diagnosed eating disorder.

Results: Compared to girls who were breastfed for more than 9 months, those who were breastfed for less than 4 months did not have a significantly different prevalence of purging, binge eating, bulimic behaviors, and self-reported history of diagnosed eating disorders. Adjusting for gestational age/birthweight, age, age at menarche, maternal history of an eating disorder, and maternal body mass index, short duration of breastfeeding was not associated with any outcome among the girls [adjusted odds ratios

(AOR) ranged from 0.8 to 1.1]. Among the boys, the results showed no significant associations between duration of breastfeeding and purging, binge eating, and self-reported history of diagnosed eating disorder. However, there was a suggestion that boys who had been breastfed for less than 4 months were at a higher risk of engaging in bulimic behaviors [AOR: 1.5, 95% confidence interval (CI), 1.0–2.3].

Discussion: No association was found between duration of breastfeeding and risk of developing bulimic behaviors or a diagnosed eating disorder among girls or boys with the one exception of longer duration of breastfeeding associated with fewer bulimic behaviors in boys. Although there are many benefits to breastfeeding, our data suggest that breastfeeding does not offer any protection against binge eating or purging, nor does it present harmful effects. © 2013 Wiley Periodicals, Inc.

Keywords: lifecourse approach; breastfeeding; disordered weight control behaviors; purging; binge eating; bulimic behaviors; eating disorders

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Introduction

Use of disordered weight control behaviors (DWCB), including skipping of meals, excessive use of appetite suppressants, laxatives and diuretics, excessive physical

activity, fasting, self-induced vomiting, and smoking cigarettes to control weight, are relatively common adolescent behaviors. School and community-based studies

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suggest that the lifetime prevalence of using DWCB is 10–62 in girls and 5–35 in boys.^{1,2} The estimated prevalence of DWCB varied dramatically depending on the age of study participants, which specific DWCB were measured, and the recall period. Prevalence of DWCB is much higher than the prevalence of eating disorders meeting full diagnostic criteria. The prevalence is higher among females, but elevated rates have been observed in several race/ethnic groups and across the weight spectrum, with the highest prevalence among overweight adolescent males and females.^{1–4} A limited number of longitudinal studies have found DWCB predicts depression^{5,6} and eating disorders meeting full diagnostic criteria in girls^{7,8} and overweight in adolescent boys and girls.^{9–11}

The prevalence of DWCB increase with age before and during adolescence, so detecting risk factors in earlier developmental stages is important for prevention interventions. Information on early life risk factors for DWCB per se is scant; therefore, we explored the relatively few studies on early life risks for eating disorders. Early introduction of solid foods in infancy and maternal feeding according to a schedule rather than infant's hunger cues have been found to be associated with anorexia nervosa in girls.¹² Eating behaviors in infancy and in early childhood, such as pickiness and struggles over eating, have been found to predict eating disorder symptoms in adolescent males and females.¹³ In addition, among a sample of white girls, higher weight status at the ages of five¹⁴ and higher scores on weight concern and body dissatisfaction at the age of five and nine were associated with higher rates of dieting at age nine.¹⁵

Breastfeeding has been examined in relation to other childhood and adolescent health outcomes, but not DWCB. Studies suggest that breastfeeding through the first year of life may protect children and adolescents against becoming overweight. In fact, three meta-analyses supported this inverse association between longer duration of breastfeeding and weight in children and adolescents.^{16–18} Parental restrictive (overcontrolled) feeding practices have been found to predict higher child weight status.^{19,20} Mothers who breastfeed may be less likely to use overcontrolled feeding practices with their offspring compared to non-breastfeeding mothers.²¹ Overweight in childhood is associated with DWCB, and both may be risk factors for eating disorders.²² Based on these relationships, we were interested in studying the associations between lack or short duration of breastfeeding with risk of developing DWCB.

The lifecourse perspective used in chronic disease epidemiology²³ offers a theoretical framework for systematic examination of early potentially modifiable risks associated with DWCB in adolescents. In this study, we were interested in the extent to which no breastfeeding or short duration of breastfeeding is associated with purging, binge eating, bulimic behaviors, and self-reported eating disorders in adolescents.

Method

The Growing Up Today Study (GUTS) was designed to assess annual weight changes, dietary intake, physical activity, and other health behaviors among teens. GUTS is a prospective cohort study of children who are the offspring of female registered nurses participating in the Nurses' Health Study II (NHS II). Participants of NHS II who had children ages 9–14 were contacted and asked for permission to enroll their offspring in a study.²⁴

The initial cohort began in 1996 and consisted of approximately 68% of eligible girls ($N = 9,039$) and 58% of eligible boys ($N = 7,843$).¹⁰ Boys and girls had separate questionnaires. Follow-up questionnaires were sent in 1997, 1998, 1999, 2000, 2001, 2003, and 2005. If GUTS participants chose not to complete a questionnaire 1 year, they were still sent the questionnaire for the next wave of data collection. The Human Subjects committees at the Harvard School of Public Health and Brigham and Women's Hospital approved the study.

Primary Exposures

Breastfeeding behavior was reported by participants' mothers in 1997. Mothers were asked if they had ever breastfed the participant, and if so, how old was the child when she stopped breastfeeding. Response choices for the duration of breastfeeding on the GUTS questionnaire were: less than 1 month; 1–3 months; 4–6 months; 7–9 months; or over 9 months. We created two breastfeeding variables: (1) dichotomous (yes/no); and (2) duration (less than 4/4 to 9/more than 9 months). We combined those who breastfed less than 1 month with those who breastfed 1–3 months due to a small number of cases.

Outcomes

Prevalence was estimated for purging, binge eating, bulimic behaviors, and self-reported eating disorders by combining all participants who reported experiencing each outcome on any questionnaire. Purging, or use of vomiting or laxatives, was assessed with two items reported by adolescents: (1) how often during the past year had s/he made him/herself throw up and (2) how often in the past year s/he took laxatives to lose weight or keep from gaining weight. The response choices were never; less than monthly; one to three times a month; once per week; two to six times per week; daily. Respondents who said one to three times a month or more to either question were coded as reporting purging; responses of never or less than monthly were coded as not using purging. Binge eating was identified through two questions reported by adolescents. First, a respondent was asked how often in the past year did s/he go on an eating binge, with possible responses of never; less than monthly; one to three times a month; once a week;

or more than once a week. As follow up, a participant was asked if, during a binge s/he felt out of control, like they couldn't stop eating even if they wanted to stop. Participants who responded that they went on an eating binge at least once a month and felt out of control while doing so were coded as reporting binge eating in the past year. We also created a broad bulimic behavior outcome variable. Participants who reported purging or binge eating at least monthly in the past year were classified as engaging in bulimic behaviors. The purging and binge eating questions were validated in the GUTS cohort by comparing self reports to a structured clinical interview.²⁵

Self-reported eating disorder diagnosis was reported by adolescents on the 2001, 2003, and 2005 questionnaires. Participants were asked if a doctor, nurse, or other health care provider had, "ever told you that they thought you had an eating disorder, such as anorexia nervosa or bulimia nervosa." Participants were also asked if they had been treated for an eating disorder by a doctor, nurse, or other health care provider. Participants who responded yes to either of these questions were coded as having a self-reported eating disorder diagnosis.

Covariates

Two indicators of concerns about participants' weight were examined as possible mediators in the relationships of interest: (1) frequent dieting and (2) a weight concerns scale. Participants were asked, "During the past year, how often did you go on a diet to lose weight or keep from gaining weight?" Response choices were never; less than once a month; 1–3 times a month; once a week; 2–6 times a week; every day. Frequent dieting was defined as dieting at least monthly. The weight concern scale from the McKnight Risk Factor Study²⁶ consists of four questions: (1) In the past year, how often have you felt fat; (2) In the past year, how often have you thought about wanting to be thinner; (3) In the past year, how often have you worried about having fat on your body; and (4) In the past year, how much have you worried about gaining 2 pounds. Response options were: never; a little; sometimes; a lot; always. The composite score was the mean of the responses for these four items and ranged from one to five. Having high weight concerns was defined as a mean score of four or more on this scale.

Adolescent body mass index (BMI) (kg/m^2) was based on self reported weight and height, after excluding implausible values of height and weight (SAS program for the Center for Disease Control and Prevention growth charts, 2007). Studies showed that self-report values of body height and weight, used for the estimation of BMI, are reasonably accurate among adolescents.²⁷ Indicators for underweight, overweight, and obese were created using standards developed by the International Obesity Task Force, which are sex- and age-specific BMI cut-offs for children and adolescents aged 2–18 years. The cutoffs correspond to the categories of underweight

(BMI < 18.5), overweight (BMI > 25), and obesity (BMI > 30) used for adults older than 18 years.^{28,29} Adolescent BMI, weight concerns, and dieting vary over time. For these analyses, these variables were taken from the questionnaire prior to the one where the outcome was first reported. For example, if binge eating was first reported in 1999, we used data from 1998 to measure adolescent BMI, weight concerns and dieting.

Participants' mothers provided additional information about themselves and their children. Based on the mother's report, a categorical variable combining birth weight and gestational age was created with the following categories: (a) preterm (<37 weeks); (b) term (≥ 37 weeks) and low birth weight (<2,500 grams); (c) term and normal weight (2,500–3,999 grams); (d) term and high birth weight (>4,000 grams). Maternal height was collected as part of the NHS II, and recall of pre-pregnancy weight was collected in 1999 to calculate pre-pregnancy BMI. Maternal self-reported eating disorder diagnosis was provided by participants' mothers in 2004; we have previously found it to be a risk factor for starting to purge among girls in GUTS.³⁰

Statistical Analysis

Bivariate associations between the two measures of breastfeeding and each of the four outcome variables (purging, binge eating, bulimic behaviors, and self-reported ED diagnosis) were estimated. Chi-square tests were used to test for difference among the girls. Fisher's exact tests were used for the boys because the outcomes were sufficiently rare. Generalized estimating equations (GEE) were also computed for each of the four outcomes, stratified by gender. GEE accounts for correlated information due to repeated measures reported by the same participant and of siblings from the same mother. All maternal, infancy and childhood or early adolescence exposures were included first in each model (maternal eating disorders, maternal pre-pregnancy BMI, birth weight for gestational age, age, and age at menarche for girls). Next, the hypothesized mediators—adolescent BMI, high weight concern, and frequent dieting—were introduced into the models first separately and then collectively. There was no material change in the adjusted odds ratios (AOR) when these mediators were introduced separately to the model; therefore, only the final model which includes all three hypothesized mediators is presented. Among boys and girls, the relationships between the primary exposure (no breastfeeding) and all outcomes were null, so only the exposure duration of breastfeeding is presented. Due to a small number of cases, we were unable to estimate the AOR for purging and self-reported eating disorders among boys.

The analyses were conducted using commercially available software (SAS version 9.1.3; SAS Institute, Cary, NC). In all analyses, participants missing any outcome, primary exposures or any other covariate were excluded. For example: 9,039 girls completed GUTS questionnaires.

TABLE 1. Distribution of primary exposures and covariates by outcomes among adolescent girls

	Purging	Binge Eating	Bulimic Behaviors	Self Report ED Diagnosis
	<i>N</i> = 6,436 % (<i>n</i>)	<i>N</i> = 6,281 % (<i>n</i>)	<i>N</i> = 6,251 % (<i>n</i>)	<i>N</i> = 5,955 % (<i>n</i>)
Any Breastfeeding				
Never	8.8 (54)	12.3 (74)	16.6 (99)	5.4 (30)
Ever	8.8 (511)	14.2 (807)	18.6 (1,053)	5.1 (277)
Duration of Breastfeeding				
Breastfed < 4 months	9.3 (178)	12.6 (237)	17.5 (326)	4.8 (84)
4–9 months	8.4 (194)	14.6 (328)	18.9 (424)	5.3 (112)
>9 months	8.7 (193)	14.7 (316)	18.7 (402)	5.4 (111)
Birthweight/Gestational Age				
Term, normal birth weight	9.1 (466)	14.1 (705)	18.6 (926)	5.4 (258)
Term, high birth weight	8.5 (69)	13.6 (108)	18.3 (144)	4.1 (31)
Term, low birth weight	8.0 (6)	15.2 (12)	18.7 (14)	6.7 (5)
Preterm	5.7 (24)	13.6 (56)	16.6 (68)	3.4 (13)
Age at Menarche^a				
<12 years	10.1 (153)	15.4 (226)	20.4 (300)	5.7 (80)
≥12 years	8.4 (412) ^b	13.6 (655)	17.8 (852) ^b	5.0 (227)
Age				
<13 years	8.3 (367)	13.5 (581)	17.8 (769)	5.0 (205)
≥13 years	9.8 (198)	15.3 (300)	19.8 (383)	5.6 (102)
Mother Had an Eating Disorder				
No	8.5 (529)	13.7 (832)	18.0 (1087)	5.0 (286)
Yes	15.5 (36) ^c	21.2 (49) ^c	28.8 (65) ^d	9.5 (21) ^b
Maternal Pre-Pregnancy BMI				
Underweight	9.1 (37)	13.5 (55)	17.9 (72)	5.6 (21)
Normal	8.9 (451)	14.2 (704)	18.5 (915)	5.3 (248)
Overweight	7.6 (54)	13.6 (94)	17.8 (122)	4.7 (31)
Obese	9.8 (23)	12.8 (28)	19.0 (43)	3.2 (7)
High Weight Concerns^e				
No	6.4 (338)	11.1 (575)	15.0 (786)	3.8 (184)
Yes	20.0 (227) ^d	28.3 (306) ^d	36.5 (366) ^d	10.9 (123) ^d
Frequent Dieting^e				
No	6.0 (298)	10.7 (520)	14.5 (711)	3.6 (163)
Yes	18.4 (267) ^d	25.2 (361) ^d	32.9 (441) ^d	10.3 (144) ^d
Adolescent BMI^e				
Underweight	5.9 (25)	12.7 (56)	14.7 (64)	11.6 (45)
Normal	9.1 (437)	13.8 (649)	18.3 (862)	5.2 (225)
Overweight	9.4 (87)	16.3 (141)	21.1 (182)	2.9 (26)
Obese	5.3 (16)	13.5 (35)	17.1 (44)	3.5 (11)

^aTaken from multiple waves.^bChi-square $p < .05$.^cChi square $p < .001$.^dChi square $p < .0001$.^eMeasured one wave before.

Respondents were excluded from the analysis if they were missing information on purging ($n = 109$); breastfeeding ($n = 454$); birth weight and prematurity ($n = 81$); age at menarche ($n = 453$); maternal pre-pregnancy BMI ($n = 1,414$); adolescent BMI ($n = 56$); weight concern scale ($n = 28$); and dieting ($n = 8$). The final sample size for purging among girls was 6,436 (71% of the original sample). Among girls, the final sample sizes for binge eating, bulimic behaviors, and self reported eating disorders were 6,281 (69.5%); 6,251 (69.1%), and 5,955 (65.9%), respectively. Among boys, the final sample sizes for purging binge eating, bulimic behaviors, and self reported eating disorders were 5,756 (73.4%); 5,691 (72.6%); 5,542 (70.7%), and 4,435 (56.5%), respectively. Participants who reported the outcome in 1996 were also excluded from the analysis of that outcome to allow for testing of the mediators.

Results

Slightly over 90% of GUTS participants are white. In this study, 9.6% of girls were never breastfed; 29.8% were breastfed less than 4 months (including those never breastfed), 35.8% were breastfed 4–9 months, and 34.3% were breastfed 9 months or longer. Among boys, 9.5% were never breastfed; 31.0% were breastfed less than 4 months (including those never breastfed), 37.1% were breastfed 4–9 months, and 31.9% were breastfed 9 months or longer.

Descriptive distributions of primary exposures and other covariates by outcomes in adolescence are shown in **Tables 1** (girls) and **2** (boys). Among girls who were and were not breastfed, the prevalence of purging (8.8% vs. 8.8% $p = 1.0$), binge eating (14.2% vs. 12.3% $p = .21$), bulimic behaviors (18.6% vs. 16.6% $p = .21$), and self-reported eating disorders (5.1% vs. 5.4% $p = .80$) appears to be similar (**Table 1**). Compared to girls who were breastfed for more than 9 months, those who were

TABLE 2. Distribution of primary exposures and covariates by outcomes among adolescent boys

	Purging	Binge Eating	Bulimic Behaviors	Self Report ED Diagnosis
	<i>N</i> = 5,756 % (<i>n</i>)	<i>N</i> = 5,691 % (<i>n</i>)	<i>N</i> = 5,542 % (<i>n</i>)	<i>N</i> = 4,435 % (<i>n</i>)
Any Breastfeeding				
Never	1.8 (10)	2.8 (15)	4.4 (23)	1.0 (4)
Ever	1.0 (52)	2.2 (115)	2.9 (145)	0.5 (19)
Duration of Breastfeeding				
Breastfed < 4 months	1.2 (22)	2.7 (48)	3.8 (66)	0.7 (10)
4–9 months	1.2 (26)	2.1 (45)	2.8 (58)	0.4 (6)
>9 months	0.8 (14)	2.0 (37)	2.5 (44)	0.5 (7)
Birthweight/Gestational Age				
Term, normal birth weight	0.9 (37)	2.3 (91)	2.9 (113)	0.5 (16)
Term, high birth weight	1.5 (17)	2.3 (27)	3.2 (36)	0.7 (6)
Term, low birth weight	0.0 (0)	1.9 (1)	1.9 (1)	0.0 (0)
Preterm	1.7 (8)	2.3 (11)	3.9 (18)	0.3 (1)
Age				
<12 years	1.1 (46)	2.2 (89)	3.1 (123)	0.6 (19)
≥13 years	1.0 (16)	2.5 (41)	2.9 (45)	0.3 (4)
Mother Had an Eating Disorder				
No	1.0 (57)	2.3 (124)	3.0 (158)	0.5 (20)
Yes	2.7 (5) ^a	3.3 (6)	5.5 (10)	1.8 (3)
Maternal Pre-Pregnancy BMI				
Underweight	0.0 (0)	1.2 (4)	1.2 (4)	0.8 (2)
Normal	1.0 (46)	2.4 (108)	3.1 (135)	0.5 (17)
Overweight	1.9 (12)	2.4 (15)	4.0 (24)	0.9 (4)
Obese	2.0 (4)	1.6 (3)	2.6 (5)	0.0 (0)
High Weight concerns^b				
No	0.9 (50)	1.9 (106)	2.6 (140)	0.4 (19)
Yes	8.8 (12) ^c	17.4 (24) ^d	21.1 (28) ^d	3.7 (4) ^a
Frequent Dieting^b				
No	0.8 (41)	1.9 (101)	2.4 (126)	0.3 (13)
Yes	5.2 (21) ^d	7.5 (29) ^c	11.2 (42) ^d	3.4 (10) ^c
Adolescent BMI^b				
Underweight	0.8 (2)	2.0 (5)	2.5 (6)	0.5 (1)
Normal	0.8 (32)	1.7 (67)	2.3 (88)	0.5 (16)
Overweight	1.6 (19)	3.6 (42)	4.9 (57)	0.3 (3)
Obese	2.3 (9)	4.3 (16)	4.7 (17)	0.9 (3)

^aFisher's exact $p < .05$.^bMeasured one wave before.^cFisher's exact $p < .001$.^dFisher's exact $p < .0001$.

breastfed for less than 4 months had a higher prevalence of purging (9.3% vs. 8.7%, respectively), binge eating (14.7% vs. 12.6%, respectively), bulimic behaviors (18.7% vs. 17.5%, respectively), and self-reported history of diagnosed eating disorder (5.4% vs. 4.8%, respectively), but the differences were not significant. Among boys there was a suggestion that those who had been breastfed had a lower prevalence of purging (1.0% vs. 1.8% $p = .07$) and engaging in any bulimic behaviors (2.9% vs. 4.4% $p = .06$). However, there was no difference in binge eating (2.2% vs. 2.8% $p = .42$) or having a self-reported history of eating disorders (0.5% vs. 1.0% $p = .17$) (Table 2). Among boys who were breastfed for less than 4 months compared to those who were breastfed longer duration, the prevalence of purging, binge eating, bulimic behaviors, and self-reported eating disorders appears to be similar.

The results of GEE for each outcome are displayed in Table 3. Among girls, there were no associations between duration of breastfeeding less than 4 months with the outcomes purging, binge eating, bulimic behaviors, and self-reported eating disorders. Compared to girls breastfed for more than 9 months, girls breastfed for less

than 4 months were no more likely to purge [AOR: 1.1, 95% confidence interval (CI) 0.9–1.3]. Among boys, duration of breastfeeding less than 4 months was associated with engaging in bulimic behaviors (AOR: 1.5, 95% CI: 1.0–2.3). However, we did not observe a significant association between breastfeeding for less than 4 months and binge eating. Because few boys engaged in purging, we were unable to estimate the associations between duration of breastfeeding and purging.

Discussion

Among a large sample of adolescents, we did not observe evidence that the lack of initiating breastfeeding increased the risk of developing bulimic behaviors. We did, however, observe a significant finding that suggests shorter duration of breastfeeding was associated with bulimic behaviors among boys. Since we had a fairly small number of cases among boys and did not observe a similar association among girls, the results should be interpreted cautiously.

TABLE 3. Unadjusted (OR) and adjusted odds ratios (AOR) and 95% CI for breastfeeding duration from GEE analysis of outcomes among girls and boys

	OR (95% CI)	AOR (95% CI) ^a	AOR (95% CI) ^{a,b}
Girls			
Purging (N = 6,436)			
Duration of Breastfeeding			
Breastfed < 4 months	1.1 (0.9–1.3)	1.1 (0.9–1.4)	1.1 (0.9–1.3)
4–9 months	1.0 (0.8–1.2)	1.0 (0.8–1.2)	1.0 (0.8–1.2)
>9 months	REFERENT	REFERENT	REFERENT
Binge Eating (N = 6,281)			
Duration of Breastfeeding			
Breastfed < 4 months	0.8 (0.7–1.0)	0.9 (0.7–1.0)	0.8 (0.7–1.0)
4–9 months	1.0 (0.8–1.2)	1.0 (0.9–1.2)	1.0 (0.8–1.2)
>9 months	REFERENT	REFERENT	REFERENT
Bulimic Behaviors (N = 6,251)			
Duration of Breastfeeding			
Breastfed < 4 months	0.9 (0.8–1.1)	0.9 (0.8–1.1)	0.9 (0.8–1.1)
4–9 months	1.0 (0.9–1.2)	1.0 (0.9–1.2)	1.0 (0.9–1.2)
>9 months	REFERENT	REFERENT	REFERENT
Self Reported ED Diagnosis (N = 5955)			
Duration of Breastfeeding			
Breastfed < 4 months	0.9 (0.7–1.2)	0.9 (0.7–1.2)	0.8 (0.6–1.1)
4–9 months	1.0 (0.8–1.3)	1.0 (0.8–1.3)	1.0 (0.8–1.3)
>9 months	REFERENT	REFERENT	REFERENT
Boys			
Binge Eating (N = 5691)			
Duration of Breastfeeding			
Breastfed < 4 months	1.3 (0.9–2.1)	1.4 (0.9–2.2)	1.3 (0.8–2.1)
4–9 months	1.0 (0.7–1.6)	1.1 (0.7–1.7)	1.0 (0.6–1.6)
>9 months	REFERENT	REFERENT	REFERENT
Bulimic Behaviors (N = 5542)			
Duration of Breastfeeding			
Breastfed < 4 months	1.6 (1.1–2.3)	1.6 (1.1–2.4)	1.5 (1.0–2.3)
4–9 months	1.1 (0.8–1.7)	1.2 (0.8–1.8)	1.2 (0.8–1.7)
>9 months	REFERENT	REFERENT	REFERENT

^aControlling for gestational age/birthweight, age, age at menarche, maternal eating disorder diagnosis, and maternal pre-pregnancy BMI.

^bControlling for adolescent BMI, high weight concern scale, and frequent dieting.

Although the GUTS is the largest study of disordered eating and body weight related problems in adolescents, with repeated assessment of many exposures and covariates over a long period of time, it may not be the ideal study for examining early life determinants of DWCB. While we had information on mothers' breastfeeding behaviors during infancy, the participants were enrolled into the study when they were at least 9 years of age. Measures during infancy and childhood, which are critical periods of development, are not included in this study. As a result, we were not able to test mediators such as maternal feeding practices and childhood overweight, in the relationships between breastfeeding and bulimic behaviors among adolescents.

A second limitation is regarding generalizability of our results. The cohort does not represent a random sample of the adolescent population in the US. Most participants were White, from a middle and high socioeconomic status, and were offspring of nurses. In this cohort, mothers were more likely to breastfeed their offspring 6 months or more and only 10% never breastfeed. These rates of breastfeeding are not representative of the US population rates of breastfeeding, which are lower and vary by region, socioeconomic status, race/ethnicity, and birth-

weight adjusted for gestational age.³¹ These characteristics of the GUTS cohort and their mothers raise some issues concerning the generalizability of our findings. Additionally, approximately 30% of participants were missing data, mostly maternal pre-pregnancy BMI. To assess the potential impact of the missingness, we conducted secondary analyses where we did not exclude participants with missing data on pre-pregnancy BMI to retain approximately 85% of the original sample. The findings were very similar to those from the primary analysis. Finally, we were limited to examining purging as the only component of DWCB among adolescents. Other behaviors adolescents use to reduce or maintain their weight such as misuse of diet pills, enemas and diuretics were not reported by the GUTS participants.

The lifecourse framework has the potential to advance our understanding of the etiology of disordered eating behaviors because it takes a developmental perspective in which the impact of factors in specific periods in life and the accumulation of those risk factors over time are examined. Mediators along the lifespan may also be tested. This framework could be used to inform the design of more effective prevention efforts across different developmental periods, and change the trajectory of developing DWCB and eating disorders in adolescence. However, despite the large sample size and prospective design of our study, our results suggest that a birth cohort would be a better study design to examine early life risk factors, such as breastfeeding, and the development of DWCB in adolescence. Future research is needed using the lifecourse framework to study a sample from infancy through childhood and adolescence, collecting information on feeding behaviors of mothers and children during different life periods.

We, as public health researchers, are aware of the potential for people to misinterpret the results of this study. Women should not be discouraged from breastfeeding on basis of these results. While we noted no protective effect for these specific outcomes, we recognize the range of benefits of breastfeeding. However, we feel that assessing the association and the causation between early life exposure such as breastfeeding and the development of DWCB in adolescence is an important research question and should be evaluated further. Risk factors for DWCB may lie in other early feeding behaviors which may provide more intervention opportunities.

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