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Postpartum Teens' Breakfast Consumption is Associated with Snack and Beverage Intake and Body Mass Index

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Abstract

Addressing high risk dietary patterns among postpartum teens may help reduce weight retention and prevent intergenerational obesity. The objective of this study was to describe the relationship between breakfast consumption and outcomes of snack and beverage intake and body mass index (BMI) among postpartum teens. During 2007–2009, 1,330 postpartum teens across 27 states participated in a cross-sectional, baseline assessment of a group-randomized, nested cohort study. Participants were enrolled in the Parents as Teachers Teen Program and completed a seven-day recall of breakfast, snack and beverage consumption. BMI was calculated from heights and weights obtained by on-site staff. Sample descriptives were compared across breakfast consumption frequency groupings by one-way analysis of variance tests or chi-square tests. General Linear Models assessed relationships between breakfast consumption and measures of snack and sweetened beverage intake, water consumption, and BMI-for-age percentile. Almost half (42%) of the sample consumed breakfast fewer than two days per week. Those who ate breakfast six to seven days per week consumed 1,197 fewer calories per week from sweet and salty snacks, 1,337 fewer calories per week from sweetened drinks, and had a lower BMI compared to those who ate breakfast fewer than two days per week ($p<.05$). Consumption of fruit, vegetables, milk, water and cereal as a snack were higher among regular breakfast consumers ($p<.05$). While breakfast consumption among postpartum teens is low, those who regularly consume breakfast had healthier snacking behaviors and weight. Interventions are needed to encourage breakfast consumption among teen mothers.

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Keywords

adolescent; postpartum; diet; BMI

INTRODUCTION

Approximately 18% of adolescents aged 12–19, or nine million youth in the United States, are overweight (1). The risk of overweight is significantly heightened for the approximately 500,000 teens who become pregnant each year (2). Postpartum weight retention exacerbates the risk for development of overweight, impaired glucose tolerance, type 2 diabetes, and other diseases (3–7). Teens are at high risk for excessive gestational weight gain during pregnancy, which is the best predictor of postpartum weight retention, due to high risk eating patterns such as frequent snacking and consumption of sugary drinks (8,9). For example, an increase in the number of snacks per day is a likely factor in the rise of overweight among children and adolescents (10). Additionally, daily consumption of sugared drinks has been associated with a 60% increase in risk of obesity and increased incidence of type 2 diabetes in young women (11). Strategies addressing high risk patterns among teen mothers may have important public health implications, as postpartum weight retention may compound with future pregnancies and timely interventions may mitigate the intergenerational transfer of high risk behaviors (12,13).

Among adult women, successful return towards pre-pregnancy weight was found more often in women with regular breakfast and lunch habits (14). Despite the many health benefits of breakfast consumption (15–22) it is the most commonly skipped meal by youth (19). Utter, et al. looked at children in New Zealand and showed breakfast skippers had lower fruit and vegetable intake and consumed more unhealthy snack foods (i.e. soft drinks, chocolate sweets and candies) (23). Other studies show that breakfast consumption is associated with lower body mass index (BMI) and better dietary intake in adolescents (20–22). To date, the frequency of breakfast consumption among postpartum teens and its relationship to BMI has not been examined.

The objectives of this study are to report the frequency of breakfast consumption among a national sample of postpartum teens, and to describe the inter-relationships among breakfast consumption, snack and beverage intake, and postpartum BMI.

METHODS

Design and Sample

This study is a cross-sectional, baseline analysis of Moms for a Healthy Balance (BALANCE), a group-randomized, nested cohort study with an intervention component aimed at reducing postpartum weight retention in teen mothers. BALANCE was developed and designed in partnership with Parents As Teachers (PAT), a parenting and child development program with over 3,000 sites across all 50 United States. BALANCE activities were incorporated within the PAT Teen Program, a specialty program that addresses the unique needs of young parents aged 12 to 19 years. PAT Teen Programs serve over 26,000 high-risk youth; from this sample 1,330 teen mothers were enrolled representing 27 states during the years 2007–2009.

Potential participants in the BALANCE study were deemed eligible if they were enrolled in the PAT Teen Program, were less than one year postpartum, and were not pregnant or planning to become pregnant. The Institutional Review Board of Washington University in St. Louis reviewed and approved all study activities, and informed consent for study

participation was obtained from each teen mother. Participants received a $15 gift card for completing the baseline survey online or on paper, when necessary.

Measures

The demographic survey measures described in the following analyses are identical to those from our prior studies with PAT and assessed age, race/ethnicity, current education level, breastfeeding status, number of children, and postpartum status (24,25). Teen mothers' participation in Women, Infants, and Children (WIC) was used as an indicator of socioeconomic status.

Teen mothers were asked to report the number of days per week they ate breakfast. Specific dietary behaviors were assessed using the Snack and Beverage Food Frequency Questionnaire (SBFFQ). An expert committee, including four registered dietitians, developed the SBFFQ for BALANCE following the format used from our previous work (24,25) and the Diet History Questionnaire (26). High calorie snack and beverage items were selected based on the most frequently consumed snacks and beverages by teenage females in the National Health and Nutrition Examination Survey (NHANES) (27). A validation study and pilot testing were completed with 60 teens. The SBFFQ examined the teen mothers' intake of 31 items during the prior seven days by asking how many days, how many times per day, and how much of the item the teen mother consumed. Using NHANES standards, intake was converted into the total calories consumed for each individual item and summed to obtain the daily caloric total using Statistical Package for the Social Sciences (SPSS) (Version 17, 2008, SPSS Inc, Chicago, IL). In the following analyses, some items were assessed by subgroups: sweetened beverages (e.g., soda and fruit juice), salty snacks (e.g., potato chips), sweet snacks (e.g., hard candy), and fruits and vegetables. Teens were also asked about cereal consumption as a snack since findings from focus groups indicated this was a common snack food (28–30). Water consumption was measured in ounces. The test-retest reliability for the composite measure of total calories was acceptable (0.63) (31). Questions from the SBFFQ can be found in the appendix.

Teen mothers' height and weight were collected to determine BMI-for-age percentile and obtained in accordance with NHANES procedures (32). Trained PAT staff assessed and recorded heights and weights and reported results to the study team. Information regarding prior attempts to lose weight was asked using two questions from the Youth Risk Behavior Surveillance Survey (33).

Data Analysis

Teen mothers reporting the care of more than one child, and those breastfeeding at the time of survey administration, were excluded from analyses (n=290). Sample characteristics for demographic measures and descriptive measures that may either confound or moderate the relationship between breakfast consumption frequency and outcomes of interest were compared across breakfast consumption frequency groupings by either one-way analysis of variance tests, or Pearson or Mantel-Haenszel χ^2 test. Univariate and General Linear Models were used to assess the relationship between breakfast consumption frequency and outcomes of daily snack and beverage intake and BMI-for-age percentile. To test whether the relationship between breakfast consumption and dietary outcomes varied by BMI-for-age percentile, a cross-product term of BMI-for-age percentile and weekly breakfast consumption frequency was included. There was no evidence of a moderation effect and the term was removed from final models. Where indicated, adjustments for either a recent attempt to lose weight or both BMI-for-age percentile and a recent attempt to lose weight were applied to reduce confounding. All statistical tests were two-tailed, and findings were considered statistically significant at alpha < 0.05. The statistical assumptions underlying

General Linear Models were assessed for violations. All data for this study were analyzed using SPSS.

RESULTS AND DISCUSSION

Sample characteristics for both demographic and potential confounding measures are presented in Table 1, summarized by total sample and across breakfast consumption frequency groupings. The mean age of our eligible participants was 17.5±1.3 years. Roughly 47% of the sample represented a minority, 91% were using WIC, and 14.2% had graduated high school, indicative of the high-risk demographic that PAT Teen Programs were designed to support. Half of the sample were either overweight or obese (49.3%) and approximately six months postpartum (187±98 days). The majority of teen mothers (56.9%) reported an attempt to lose weight prior to survey administration, with a combination of both exercise and diet being the most popular approach. Forty-two percent of teen mothers reported consuming breakfast zero to two days per week. No relationship was found between age, education, race/ethnicity, or percent using WIC and breakfast consumption frequency in postpartum teens.

Table 2 presents BMI-for-age percentile and daily beverage and snack intake by breakfast consumption frequency groupings, controlled for potential confounding factors. After controlling for BMI-for-age percentile and weight loss attempts, participants reporting at least six to seven days of breakfast consumption consumed fewer calories from sweetened beverages, salty snacks, sweet snacks, and consumed fewer total calories from snacks and beverages than participants reporting zero to two days of breakfast consumption. Conversely, fruit and vegetable, cereal, milk, and water consumption were highest among the regular breakfast consumers. BMI-for-age percentile remained associated with breakfast consumption frequency after controlling for those reporting an attempt to lose weight.

There are several findings from this study that contribute to the growing literature on teen dietary intake. First, 42% of our postpartum teens skipped breakfast, compared to other studies that have shown 10–30% of adolescents skipped breakfast (34). Affenito et al. found race impacted breakfast frequency, with 19.1% of white and 24.2% of African American girls skipping breakfast by age 19 (15). However, African American and Hispanic teen girls in this study ate breakfast with the same frequency as white girls. This might be explained by the fact that a greater proportion of this sample reported skipping breakfast, which could have lessened the racial disparities. Reasons that adolescents skip breakfast (i.e., lack of time, lack of hunger, prefer to sleep, and attempting to lose weight) may be more prevalent in postpartum teens who are also juggling the demands of parenting (35,36).

The second finding provides further evidence of the relationship between breakfast consumption and beverage intake, and how it might impact weight retention among postpartum teens. Teen mothers who ate breakfast most days of the week consumed over 1,300 fewer calories per week from sweetened drinks than those who skipped breakfast. This is consistent with findings among teens in general, where sweetened drinks are associated with increased energy intake and BMI (11). Therefore, it is not surprising that those who regularly consumed breakfast had a lower BMI and consumed 1,477 fewer calories per week from snacks and beverages than those who skipped breakfast.

Similar to other studies (37–39), findings of this study suggest those who regularly consume breakfast have an overall healthier diet. Those who ate breakfast frequently consumed more fruits and vegetables and drank more milk and water (38 more ounces/day) than those who skipped breakfast. Also, those who ate breakfast most days of the week snacked more on cereal and less on sweet and salty snacks. Given the frequent intake of unhealthy snacks and

beverages in adolescents (10), encouraging regular breakfast consumption holds promise as a means to help this population improve their overall diet.

Finally, these data have particular relevance not only for addressing weight retention in teen mothers, but in their children. Numerous studies have documented the importance of the parent as a model to their child (24,25,40–43). Teen mothers now take on that responsibility and control the food environment for their child. Thus patterns exhibited by the mothers, including lack of breakfast and high risk sweetened drink and snacking behavior, might influence the intake of their young child. Over time and left unchanged, these behaviors are reinforced as the child observes that parent and has access to high risk foods in their environment. Early intervention is needed to encourage appropriate nutritional patterns that can be passed from teen mother to child, and prevent intergenerational obesity (44).

Despite a large diverse sample size, there are some limitations worth noting. There was reliance on self-reported data for dietary intake and breakfast consumption. The teen mothers' reported intake may not reflect a usual week's intake. Measurement errors, such as underreporting, are often seen when using an FFQ (45,46). In addition, a modified FFQ was used that asks about specific foods and only looked at beverage and snack intake. Teen mothers may consume beverages and snacks that do not appear on the FFQ.

CONCLUSIONS

This study highlights the important role of breakfast consumption on positive dietary behaviors and BMI of postpartum teens. Despite this, regular breakfast consumption among this high risk group of postpartum teens is low. Strategies to increase breakfast consumption in this group are needed, not only to prevent weight retention and obesity, but also to enable these young parents to be positive role models for their children. Educational and behavioral interventions tailored to the developmental needs of postpartum teens should be tested and incorporated into routine practice. Further research is needed to identify and overcome environmental barriers and facilitators to frequent, healthy breakfast consumption in this high risk group.

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Appendix

Appendix 1
Snack and Beverage Food Frequency Questionnaire: Parents as Teachers Teen Program

The following lists refer to the beverages and snack foods that you drank or ate over the past week (last seven days). If you don't know what the food or beverage is, you probably didn't eat or drink it.

Questions			
Over the past week, how many days did you drink/eat [item]: (response options: None – Every day)	On the days when you drank/ate the following [item], on average, how many times did you drink/eat [item] throughout the day and night? (response options: 1–15)	Each time you drank/ate [item], how much did you usually drink/eat?	
Item		**Portion size response options**	
water		• 8 oz (1 cup) • 12 oz (1.5cups) • 16.9 oz (.5liter) • 4 oz (.5 cup)	• 20 oz (2.5cups) • 4 oz (3cups) • 32 oz (approx. 1liter)
regular soft drinks, soda or pop *(such as cola, pepper type, dew type, white, root beer, orange, grape or other fruit flavor)*		• 8 oz (1 cup) • 1 small fountain cup • 1 medium fountain cup (1.2 liter)	• 20oz bottle • 1 liter • 1 large fountain cup • 1 supersize fountain cup
diet soft drinks, soda or pop *(such as cola, pepper type, dew type, white, root beer, orange, grape or other fruit flavor)*			
100% juice with no added sugar *(such as orange juice, apple juice, or pineapple juice) Don't include fruitade, punch, Kool-Aid, sports drinks, or other fruit flavored drinks.*		• small juice box (4 oz) • regular juice box or pouch (6.75oz)	• 1cup (8oz) • 10oz bottle • 14oz bottle • 16oz bottle (2 cups)
regular fruitade or fruit punch *(such as lemonade, Frutopia, Hi-C, Hawaiian Punch, or other noncarbonated fruit drinks)*			
light or sugar-free fruitade or fruit punch *(such as lemonade, limeade, Hi-C, Hawaiian Punch, or other noncarbonated fruit drinks)*			
regular sports drinks *(such as Gatorade, PowerAde, or AllSport) Don't include light sports drinks.*		• 8 oz (1 cup) • 1 small fountain cup • 1 medium fountain cup (1.2 liter)	• 20oz bottle • 1 liter • 1 large fountain cup • 1 supersize fountain cup
light sports drinks *(such as Propel Fitness Water, or PowerAde Option)*			

Questions		
2% or whole milk **skim, ½%, or 1% milk** **flavored milks with 2% or whole milk** **flavored milks with skim, or 1% milk**	• ½ cup (4oz) • 1 small carton (8oz) • 1 small fountain cup (12oz)	• 1 chug or nesquik bottle (16oz) • 1 medium fountain cup • 1 large fountain cup
sweetened teas **unsweetened or diet teas**	• 8 oz (1 cup) • 1 small fountain cup • 1 medium fountain cup (1.2 liter)	• 20oz bottle • 1 liter • 1 large fountain cup • 1 supersize fountain cup
coffee or espresso	• 1 shot espresso • 1 double shot espresso • 1 cup (8oz)	• 1 tall cup (12oz) • 1 grande cup (16oz) • 1 vente cup (20oz)
potato chips, tortilla chips, corn curls, corn puffs or corn chips *Don't include baked chips.* **baked potato chips or tortilla chips**	• 100 calorie pack • 1 small snack bag (1oz) • ½ grab bag (1.5oz)	• 1 vending bag (2oz) • 1 grab bag (3 oz) • 1 regular bag (11oz) • 1 family size bag
regular popcorn **light popcorn**	• 100 calorie pack • 1 mini snack microwave bag • ½ regular microwave bag	• 1 regular microwave bag • 1 small theatre popcorn • 1 medium theatre popcorn • 1 large theatre popcorn
pretzels	• 100 calorie pack • 1 small snack bag (1oz) • ½ grab bag (1.5oz)	• 1 vending bag (2oz) • 1 grab bag (3 oz) • 1 big bag (8oz) • 1 big bag (16oz)
crackers	• 100 calorie pack • ½ snack bag (11 crax) • 1 snack bag or 22 crax (1oz)	• ½ grab bag or 33 crax (1.5oz) • 1 grab bag (3 oz) • 1 regular box (9oz) • 1 large box (16oz)
granola bars	• 1/2 granola bar • 1 granola bar • 2 granola bars	• 3 granola bars • 4 granola bars
snack cakes, donuts, or toaster pastries	• 1/2 snack cake or pastry • 1 snack cake or pastry	• 2 snack cake or pastry • 3 snack cake or pastry • 4 snack cake or pastry
cookies	• 100 calorie pack	• 2 bakery sized cookie – 3.5"Diameter

Questions		
	• 3 sandwich cookies or 9 minis (1oz) • 6 sandwich cookies or 18 minis (2oz) • 1 bakery sized cookie – 3.5”Diameter	• 3 bakery sized cookie – 3.5”Diameter • 4 bakery sized cookie – 3.5”Diameter
chocolate candy	• 1 fun siz bar, 4 kisses or 2 minis (.7oz) • 2 fun siz bar, 8 kisses or 4 minis (1.4oz)	• 1 chocolate bar or ¼ cup M&Ms (1.5oz) • 1 regular candy bar or 1 bag M&Ms (1.75oz) • 1 king size bar or ½ cup of M&Ms (3.5oz)
hard candy or taffy	• 3 jolly ranchers or starbursts, 2 twizzlers or 1/8 cup skittles (.5oz) • 6 jolly ranchers or starbursts, 4 twizzlers or ¼ cup skittles (1oz)	• 9 jolly ranchers or starbursts, 6 twizzlers or 1/3 cup skittles (1.5oz) • 12 jolly ranchers or starbursts, 8 twizzlers or 1 bag skittles (2oz) • 18 jolly ranchers or starbursts, 16 twizzlers or ¾ cup skittles (3oz)
French fries	• small size fry • 1 medium size fry	• 1 large size fry • extra large fry
pizza	• ½ personal pan • 1 personal pan • 1 slice (1/8 of large pizza)	• 2 slices of large pizza • 3 slices of large pizza • 4 slices of large pizza
cereal	• 100 calorie pack • ½ cup • 1 variety pack box	• 1 cup • 2 cups • 3cups • 4 cups
canned or fresh fruits	• 1/2 small fresh fruit or ¼ cup fruit chunks • 1 small fresh fruit or 1/2 cup fruit chunks	• 1 medium fresh fruit or 1 cup fruit chunks • 1 large fresh fruit or 2 cups fruit chunks
canned or raw vegetables	• ¼ cup cooked or ½ cup raw vegetables • ½ cup cooked or 1 cups raw vegetables	• ¾ cup cooked or 1-½ cups raw vegetables • 1 cup cooked or 2 cups raw vegetables

Chug: Dean’s Food Company, Sharpsville, PA
Kraft Foods, Inc, Northfield, IL.
Coca-Cola Co, Atlanta, GA.
Dr Pepper Snapple Group, Plano, TX.
Pepsico, Purchase, NY.
All Sport Inc, Austin, TX.
Nesquik: Nestle, Glendale, CA
Jolly Ranchers: Hershey Company, Hershey, PA

Starbursts: Mars, Inc., McLean, VA
Twizzlers: Hershey Company, Hershey, PA
Skittles: Mars, Inc., McLean, VA

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Table 1

Baseline Characteristics of Postpartum Teens: Parents as Teachers Teen Program (n=904)

Sample Characteristics	Total n=904	*Breakfast Consumption Frequency Groupings* 0–2 days/wk. n=381	3–5 days/wk. n=295	6–7 days/wk n=228	p-value
	Mean (St. Dev)				
Age (y)	17.5 (1.3)	17.5 (1.2)	17.4 (1.3)	17.5 (1.3)	0.32[a]
BMI-for-Age Percentile	60.8 (30.0)	65.2 (29.4)	57.4 (30.9)	58.0 (29.1)	<0.01[a]
Number of Days Postpartum	187.0 (98.0)	191.0 (97.0)	189.0 (98.0)	178.0 (99.0)	0.40[a]
Race/Ethnicity					0.87[b]
White, n=468	53.2%	54.4%	50.2%	55.0%	
Black, n=236	26.8%	25.6%	28.9%	26.1%	
Hispanic, n=155	17.6%	18.1%	18.2%	16.1%	
Other, n=21	2.4%	1.9%	2.7%	2.8%	
Education Level					0.31[b]
9th Grade, n=70	7.9%	6.9%	8.9%	8.1%	
10th Grade, n=130	14.5%	12.7%	16.0%	15.7%	
11th Grade, n=222	24.8%	24.8%	24.6%	25.1%	
12th Grade, n=282	31.6%	36.7%	29.0%	26.0%	
Graduated, n=128	14.2%	12.4%	14.0%	17.9%	
Withdrew, n=63	7.0%	6.6%	7.5%	7.2%	
Participate in WIC					0.97[b]
Yes, n=823	91.0%	91.3%	90.5%	91.2%	
BMI[c]					0.04[d]
Normal Weight, n=417	50.7%	46.0%	56.0%	51.5%	
Overweight, n=231	28.2%	29.2%	24.5%	30.9%	
Obese, n=175	21.1%	24.9%	19.4%	17.6%	
Attempted to lose weight in past 30 days					<0.01[b]

Sample Characteristics	Total n=904	*Breakfast Consumption Frequency Groupings* 0–2 days/wk. n=381	3–5 days/wk. n=295	6–7 days/wk n=228	p-value
No, n=387	43.1%	39.2%	47.1%	44.4%	
Yes, Exercise, n=139	15.5%	15.1%	16.3%	15.1%	
Yes, Diet, n=116	12.9%	14.8%	14.9%	7.1%	
Yes, Both, n=117	28.5%	31.0%	21.7%	33.3%	

[a] One-Way ANOVA,

[b] χ^2,

[c] IOTF = International Obesity Task Force Definition for Adolescent Overweight,

[d] Mantel-Haenszel χ^2

Table 2

Baseline Breakfast Consumption Frequency for Postpartum Teens: Parents as Teachers Teen Program (n=904)

	Breakfast Consumption Frequency Groupings						
Outcome Measures	**0–2 days/wk. (n=381)**		**3–5 days/wk. (n=295)**		**6–7 days/wk. (n=228)**		**p-value**
	Mean (95% CI)						
BMI-for-Age Percentile[a]	**66.3**	(62.9–69.6)	**59.2**	(55.5–63.0)	**59.2**	(54.8–63.6)	0.005
Total Calories[b]	**1717 .0**	(1593–1840)	**1641.0**	(1502–1781)	**1506 .0**	(1342–1669)	0.111
Calories from Sweetened Beverages[b]	**518.0**	(468–568)	**418.0**	(362–475)	**327.0**	(261–393)	0.000
Calories from Salty Snacks[b]	**268.0**	(221–314)	**259.0**	(207–312)	**159.0**	(97–221)	0.011
Calories from Sweet Snacks[b]	**271.0**	(230–312)	**251.0**	(205–297)	**209.0**	(155–263)	0.174
Calories from Cereals[b]	**46.1**	(31.8–60.5)	**53.9**	(37.7–70.0)	**73.8**	(54.8–92.8)	0.000
Calories from Fruit & Vegetables[b]	**28.4**	(24.6–32.1)	**30.2**	(26.0–34.4)	**36.3**	(31.5–41.2)	0.059
Calories from Milk Products[b]	**244.0**	(195–293)	**307.0**	(252–363)	**353.0**	(288–418)	0.011
Water Consumption in Ounces[b]	**45.1**	(33.4–56.8)	**38.5**	(25.3–51.6)	**83.2**	(67.8–98.7)	0.028

[a] GLM controlling for Self-Reported Attempts to Lose Weight in the Past 30 Days

[b] GLM controlling for BMI Percentile for Age & Self-Reported Attempt to Lose Weight in the Past 30 Days