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Are there nutritional and other benefits associated with family meals among at-risk youth?

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Abstract

Purpose—The literature suggests positive associations between family dinner frequency and dietary practices and psychosocial well-being, and inverse associations between family dinner frequency and overweight status among general adolescent populations. The present study aims to examine these associations among a population of adolescents at-risk of academic failure.

Methods—A racially-diverse sample of adolescents (n=145, 52% male, 61% nonwhite) from six alternative high schools (AHS) completed surveys and had their heights and weights measured by trained research staff. Mixed model logistic regression analyses assessed associations between family dinner frequency and overweight status, healthy and unhealthy weight management, and food insecurity, while mixed linear models assessed associations with breakfast consumption, fruit and vegetable consumption, high fat food intake, fast food intake, substance use, and depressive symptoms. Analyses adjusted for race/ethnicity, age, gender, socioeconomic status, and the random effect of school.

Results—Family dinner frequency was positively associated with breakfast consumption and fruit intake ($p<.01$ and $p<.05$, respectively), and inversely associated with depressive symptoms ($p<.05$). Adolescents who reported never eating family dinner were significantly more likely to be overweight (Odds ratio (OR) = 2.8, Confidence Interval (CI) = 1.1–6.9) and food insecure (OR=6.0, CI=2.2–16.4) than adolescents who reported 5–7 family meals per week.

Conclusions—In this at-risk sample of youth, some, but not all of the benefits of family meals found in other studies were apparent. Intervention programs to increase the availability and affordability of healthful foods and promote family meals for families of AHS students may be beneficial.

Keywords

alternative high schools; family meals; family dinner; overweight; diversity; psychosocial well-being; at-risk; nutrition; obesity prevention

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Introduction

Rates of obesity among youth are higher than ever before, with more than one-third of 12–19 year olds currently overweight or obese (1). Overweight and obesity prevalence is disproportionately higher among minority and lower income youth (1, 2), indicating that more concentrated efforts targeting healthful eating and physical activity practices are needed for at-risk youth to effectively reduce health disparities.

Efforts to increase healthful eating among youth are needed due to low fruit and vegetable consumption and high intakes of dietary fat, saturated fat, sweetened beverages and fast foods among adolescents (3, 4). Most youth do not meet the recommended dietary guidelines for a healthy lifestyle (5) and racial and economic disparities are evident (6, 7).

A growing body of literature suggests that youth who eat meals with their family report more healthful dietary intake, including higher intakes of fiber, fat, several vitamins and minerals, and fruits and vegetables, as well as more frequent breakfast consumption (8–10). Similarly, the frequency of family meals has also been shown to have significant inverse associations with the consumption of soft drinks and high-fat foods (8). However, the research to date has been limited to general, primarily Caucasian populations of youth, with the exception of one study (10) that included a diverse youth sample from traditional school settings.

Few studies to date have examined the potential benefits of family meals beyond their nutritional impact. However, four published articles have shown significant inverse associations between family meal frequency and disordered eating (e.g., unhealthy weight management) (11–14). In addition, studies have shown modest inverse cross-sectional associations between family dinner frequency and body mass index (8); significant associations with overweight status have been limited to subsamples of white adolescents (15) or young females (16). Few studies have examined these associations longitudinally (14–16) and results have been mixed. Overall, these studies appear to indicate that family meal frequency may be inversely associated with risk of disordered eating, and with overweight in cross-sectional studies. However, family meal frequency may not protect against risk of overweight over time.

In addition, several cross-sectional and longitudinal studies have shown significant inverse associations between family meal frequency and substance use (11, 17–19), and depressive symptoms (11, 17). Thus, beyond the immediate benefits of healthful eating habits from family meals, the family mealtime environment may be a factor in psychosocial health among adolescents.

Most of the studies to date have examined associations between family meal frequency and adolescent health among general adolescent populations that typically do not include at-risk youth. Thus, less is known about whether the beneficial associations with family meals occur with adolescents at-risk of academic failure. Many youth at-risk of academic failure in the United States attend alternative high schools (AHS) (20). AHS typically have higher minority student enrollments and higher poverty concentrations than traditional high schools (20), and compared to students attending traditional high schools, youth attending AHS are less likely to be living in two-parent households (21), and more likely to use alcohol and other drugs, sustain violence-related injuries, engage in sexual behavior and report obesity-related behaviors such as unhealthful eating and sedentary behaviors (21–23). However, few research studies have examined obesity-related risk behaviors among AHS youth (24–25).

The goals of the present study were to assess whether associations between family meal frequency and dietary practices, overweight status, and psychosocial well-being found in

studies of adolescents in the general population are present in a population of youth at-risk of academic failure. In previous research, examinations of associations with family meal frequency range from dietary practices to psychological well-being, and often only one area is assessed in each study. In the present study, we have the opportunity to assess associations between family meal frequency and many outcomes related to adolescent health ranging from dietary practices to psychological well-being in an at-risk population. The evaluation of these associations in at-risk adolescents may inform interventions to promote health.

Methods

Students were participants in the Team COOL (Controlling Overweight and Obesity for Life) pilot study, a group randomized trial to evaluate the feasibility and acceptability of an AHS-based intervention to prevent further weight gain and/or promote healthy weight loss among students by promoting physical activity and healthy eating (26). The present study was based on baseline data collected in the fall of 2006, prior to implementing the study intervention.

Sample and Procedures

Four urban and two suburban AHS in the Minneapolis/St. Paul metropolitan area participated in the study. All enrolled students were eligible to participate in a psychosocial survey and height/weight measurements. Trained research staff obtained student assent (and parental consent for those younger than 18 years of age) and administered the survey during one class period. The survey items assessed demographic information, and personal, behavioral and school-related social-environmental factors associated with the dietary and physical activity practices of adolescents. Survey items came from previously published surveys. Trained research staff collected height/weight measures in a private area. At baseline, students received a \$5 gift card for completing measures. The study was approved by the University of Minnesota Human Subjects Research Committee.

The average enrollment across the six schools was 102 students (range: 27 to 142). Sixty-four percent of students were racial/ethnic minorities (range = 31%–96%), 53% of students were male, and 60.5% (range: 40% to 96%) qualified for free/reduced school meals (a poverty indicator).

Across the six schools, 145 students completed both the survey and anthropometric measures. A typical participation rate for this study is difficult to calculate because many AHS do not have the same daily school attendance requirements as traditional high schools. We can estimate the study's participation rate based on an adjusted enrollment calculated by multiplying a school's 2006–2007 enrollment by the prior year's attendance rate. Thus, based on an average adjusted enrollment of 68 students (range: 16 to 107), the participation rate across schools was 36% (range: 18% to 100%). Among the study sample, 52% of students were male, 61% racial/ethnic minorities and 60% qualified for free/reduced meals.

Demographic Characteristics—Demographic characteristics such as age, gender, race/ethnicity, poverty indicators, and living arrangements were assessed with the student survey. For race/ethnicity, students were instructed to select as many racial/ethnic categories as they deemed appropriate to represent themselves (options included white, black/African American, American Indian, Asian, Latino, Other). In order to reduce degrees of freedom with our limited sample size, analyses included a 3-group variable of “white,” “black/African American,” or “Other” (American Indian, Asian, Latino, Other). Socio-economic status (SES) was assessed with two questions related to public assistance (free/reduced lunch status: “Do you get free or low-cost lunches at school?” or public assistance: “Does your family get public assistance (welfare, food stamps or other assistance)?”). Responses to

both items were “yes,” “no,” “I don’t know,” representing “low,” “high,” or missing SES, respectively. The free or low-cost lunch SES variable was used in analysis unless it was missing and then the public assistance variable was used. Students’ living arrangements were assessed with a question regarding who s/he lives with most of the time. Response options included “mother and father together,” “parent and step parent” (both responses recoded as “both parents” for analysis), “mother mostly” (coded “mother mostly” for analysis). Other responses including “mother and father equally, at separate houses,” “father mostly,” “grandparent,” “other relative,” “foster parent,” “an adult or adults I am not related to,” “friends or others my age,” “no one, I live alone” were all recoded as “Other” for analysis.

Dietary Practices

Breakfast Consumption: Breakfast consumption was assessed with the item “During the past week, how many days did you eat breakfast?” Response options were “Never,” “1 day” to “6 days” to correspond to the number of days per week, and “every day” for every day of the week (27).

Fruit and vegetable consumption: Fruit and vegetable consumption was assessed by a previously validated 6-item fruit and vegetable screener (28). Students were asked: “Think about your usual eating habits over the past year. About how often do you eat each of the following foods and beverages?” Fruit and beverage items included 100% fruit juice, fruits, vegetables, green salad, potatoes excluding French fries, and carrots. Separate “fruit” and “vegetable” scores were calculated and also combined into a “fruit and vegetable” score. Six response categories ranged from “Less than once a week” to “5 or more times a day.” Data were recoded as daily servings and modeled as a continuous variable. The internal consistency reliability alphas for the fruit, vegetable, and combined scores for the present study sample were 0.64, 0.81, and 0.85, respectively.

High fat food intake: A score was created to calculate high fat food intake using the following item: “Think about your eating habits over the past year. About how often do you eat each of the following foods? Remember to count breakfast, lunch, dinner, snacks, and eating out (Mark one response for each food).” A list of high fat foods, including hamburgers, hot dogs, margarine/butter, pizza, French fries, and others were provided for the checklist. Response options included “1 time a month or less,” “2–3 times a month,” “1–2 times a week,” “3–4 times a week,” and “5 or more times a week” (29). Response options were recoded to reflect weekly intake (score range = 4.25 to 64.5, $M = 26.1$; $\alpha = 0.89$).

Fast food restaurant use: Frequency of fast food restaurant use was measured with one item, “Outside of the school day, during a normal week (including weekend days), how many times do you eat or drink something from a fast food restaurant, like McDonald’s, Taco Bell or Pizza Hut?” (10). Six response categories ranged from “Never” to “More than 7 times.” Response options were recoded to reflect times per week.

Regular soda pop consumption: Students reported the frequency of their intake of regular soda pop (not diet) over the past month. Ten response categories ranged from “Never” to “5 or more times a day” for each beverage. Response options were recoded to reflect “less than weekly,” “weekly,” and “daily” consumption (30).

Overweight Status—Student height (in centimeters) and weight (in kilograms) were assessed by trained staff according to standardized protocols (31). Anthropometric values were used to calculate body mass index (BMI) and age- and gender-adjusted BMI percentiles based on the Center for Disease Control (CDC) growth references (32). Students

with a BMI greater than or equal to the 85th percentile were categorized as overweight/obese; those with a BMI between the 5th and < 85th percentile were categorized as normal weight.

Healthy and Unhealthy Weight Management—A variable of healthy weight management was created from two items with the same stem: “During the past 30 days, did you”...1) “exercise to lose weight or to keep from gaining weight?” 2) “...eat less food, fewer calories, or foods low in fat to lose weight or to keep from gaining weight?” Response options were “yes” or “no.” Responses were dichotomized into “0” if responses were “no” to both questions, or “1” if either or both of the two items was answered yes. A similar process was used to create a disordered eating or unhealthy weight management variable using the following three items: “During the past 30 days, did you”...1) “go without eating for 24 hours or more (also called fasting) to lose weight or keep from gaining weight?” 2) “take any diet pills, powders, or liquids without a doctor’s advice to lose weight or to keep from gaining weight?” 3) “vomit or take laxatives to lose weight or to keep from gaining weight?” These items have been used in national surveys and have acceptable moderate test-retest reliability ($kappas = 0.40\text{--}0.57$)(33).

Other Aspects of Health

Food Insecurity: Food insecurity was assessed with one item (34–35): “How often during the past 12 months have you been hungry because your family couldn’t afford more food?” Response options were “almost every month,” “some months but not every month,” “only one or two months,” and “I have not been hungry for this reason.” Response options were dichotomized to reflect any food insecurity (first three response options) compared to food security (last response option).

Substance Use: Substance use was assessed by adapting items from previous research about past year use of the following substances: cigarettes; beer, wine, hard liquors; marijuana; drugs other than marijuana (acid, cocaine, crack, ecstasy, methamphetamine) (36). Response options were 1–5 for “never,” “a few times,” “monthly,” “weekly,” and “daily,” respectively. An additive scale score was created with the four items, with scores ranging from 4 to 19 ($\alpha = 0.71$ for the present sample).

Depressive Symptoms: Depressive symptoms were assessed using a six item scale developed by Kandel & Davies (37). Students were asked: “During the past month, how often have you been bothered or troubled by...” followed by “feeling too tired to do things,” “having trouble going to sleep or staying asleep,” “feeling unhappy, sad or depressed,” “feeling hopeless about the future,” “feeling nervous or tense,” and “worrying too much about things.” Response options were “not at all,” “sometimes,” and “very much.” Scores ranged from 10 to 30 (37) and $\alpha = 0.82$ for the study sample.

Family Meals—Frequency of family meals was measured using the single item, “During the PAST WEEK, how many days did all, or most of the people you live with eat dinner together?”(10). Response categories were “Never,” “1 day” ... “6 days” to correspond to the number of nights per week, and “every day” for every night of the week. Response options were categorized into three options: “never,” “1–4 days per week” and “5–7 days per week” based on the distribution of responses.

Statistical Analysis

Mixed model logistic regression was used to examine associations between family meal frequency and dichotomous dependent variables (e.g., overweight status). Mixed model linear regression was used to examine associations between family meal frequency and

continuous dependent variables (e.g., weekly breakfast consumption). The following covariates were included in all models: race/ethnicity, age, gender, and SES. The Team COOL pilot study was designed as a group randomized trial with schools as the unit of analysis since data from students in the same schools are likely to be correlated (38); thus, we included “school” in the model as a random effect. Associations were considered significant beyond chance at $p < 0.05$. All analyses were conducted using SAS version 9.1 (SAS Institute, Cary, NC).

Results

As shown in Table 1, the average age of students was 17.3 years. The sample was evenly split between males and females, and 60% were adolescents of color. About two-thirds of students were from low income households, with almost one half living in households headed by single mothers, followed by two-parent households.

Among students, 50% reported eating family dinner 5–7 times per week, 24% reported eating family dinners 1–4 times per week, and 26% reported not eating family dinners in the past week. Family dinner frequency did not differ significantly by demographic characteristics (see Table 1).

As shown in Table 2, family dinner frequency was significantly positively associated with breakfast frequency and daily fruit consumption. Adolescents reporting 5–7 family dinners per week had a significantly higher frequency of breakfast consumption and significantly higher daily servings of fruit consumption than adolescents reporting fewer family dinners. Family dinner frequency was not significantly associated with vegetable consumption, combined fruit and vegetable consumption, high-fat food intake, fast food restaurant use, or regular soda consumption.

As shown in Table 3, adolescents who reported no family dinners in the past week were almost three times more likely to be overweight and six times more likely to be food insecure than adolescents who reported eating 5–7 family dinners per week. Family meal frequency groups did not differ significantly in their report of unhealthy or healthy weight loss practices.

As shown in Table 4, family dinner frequency was significantly inversely associated with depressive symptoms. Adolescents reporting 5–7 family dinners per week had significantly lower depressive symptom scores than adolescents reporting no family dinners in the past week. Family dinner frequency was not significantly associated with substance use, although there was a trend ($p < 0.07$) for adolescents reporting 5–7 family dinners per week to use substances less frequently than adolescent reporting no family dinners per week. Analyses by substance type did not reveal significant group differences (data not shown).

Discussion

The goals of the present study were to assess whether associations between family meal frequency and dietary practices, overweight status, and psychosocial well-being are present in an at-risk population of youth attending alternative high schools. In this sample of youth, some, but not all of the benefits of family meals found in other studies were apparent, indicating that intervention programs to promote family meals may be beneficial, but likely need increased attention to the specific needs of at-risk youth, including availability and affordability of healthful foods and family structure.

Our finding of a significant inverse association between family meal frequency and overweight status among youth in this cross-sectional analysis has been identified by our

previous analyses as one of the important correlates of overweight (26), corroborates previous research findings among adolescents (14–16), and highlights the potential for promoting family meals as a strategy to stem the high rates of obesity among youth. This is particularly relevant given that the present study sample is more likely to be overweight (40%) than similarly aged youth in the general population (34%) (1) and more likely to be from low SES households. We did not find the protective effect of family dinner frequency on weight management practices that has been shown in the literature (11–14). The relatively low rates of disordered eating in our sample prohibited us from stratifying analyses by gender to examine associations between family meal frequency and healthy and unhealthy weight management practices that are more common among females than males (13). Future research is needed to assess these associations by gender among at-risk youth.

Our null findings in regard to associations between family dinner frequency and several measures of healthful dietary practices, particularly combined fruit and vegetable consumption, fast food and soda consumption, conflict with previous research findings (8–10). The relatively large standard errors for overall fruit and vegetable intake among our small sample of youth at-risk of academic failure may have prevented us from detecting significant differences between groups. However, when we assessed fruit and vegetable consumption separately, our findings suggested that fruit consumption was higher among adolescents reporting frequent family dinners (5–7 meals per week) compared to other adolescents. Similarly, the significant and positive association between family dinner frequency and breakfast consumption is consistent with previous literature (9). Overall, comparing our findings with previous research suggests that some, but not all of the positive associations between family meals and dietary intake apply to youth at-risk of academic failure.

With regard to psychosocial health, our finding of a significant inverse association between family dinner frequency and depressive symptoms is consistent with previous research (11, 17). These findings appear robust across various adolescent samples and measures of depressive symptoms. In contrast, our null finding regarding associations between family dinner frequency and substance use is inconsistent with previous research (11, 17–19). The sample differences may be a culprit. Substance use is much more common in students attending AHS compared to students attending traditional high schools (21–22). Thus, either our AHS sample is already using substances at a higher rate than students in other studies or use does not vary by time spent with family as typically seen in younger adolescents or students attending traditional high schools.

Our finding of a significant inverse association between family dinner frequency and food insecurity highlights the poor economic conditions among some youth attending AHS. It makes sense that fewer family dinners happen in households where there is not enough food to eat. This finding above all others suggests that one of the prime areas for intervention with families of alternative high school students is availability and affordability of healthful foods. Promotion of family dinners could be a secondary goal once these issues are addressed. Addressing food insecurity might begin with helping students in AHS settings identify community resources and food assistance programs, and the potential role the students may play in helping their families find creative ways to purchase healthful foods within budgetary constraints (39). In addition, programs could be developed to promote collaborations between youth and community/neighborhood organizations and local food shelves.

The present study has several limitations that should be taken into account when interpreting the findings. The limitations include the self-report nature of the survey data, the cross-sectional study design, and the relatively low response rate and sample size. The cross-

sectional study design limits our ability to assess whether family dinner frequency is a protective factor for adolescent health as we can only attest to significant associations. The relatively low response rate to the survey (36%) is lower than that typically seen in student surveys. However, the present study sample is from an at-risk population of which little is known and the sample is representative of students in the schools measured. Moreover, the racial/ethnic and economic diversity of our student sample is consistent with characteristics of students in AHS nationally (20, 23). The relatively small sample size also prohibited stratification by gender in some of the analyses. Some of the strengths of the present study include the presentation of a relatively comprehensive set of psychometrically-sound measures to assess health. In addition, height/weight data were collected by trained research staff rather than student self-report. Given the dearth of data regarding youth in AHS settings, the present study contributes substantially to the literature regarding family meals and adolescent health.

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Table 1

Demographic characteristics of alternative high school students for the total sample and by family meals frequency groups

	Total	Never eats family meals	Eats family meals 1–4 times/week	Eats family meals 5–7 times/week
	N=143^I (%)	N=37 (%)	N=34 (%)	N=72 (%)
<u>Age: Mean (SD)</u>	17.2 (1.2)	17.3 (1.2)	17.3 (1.2)	17.1 (1.2)
Gender				
Female	68 (49%)	18 (28%)	16 (24%)	31 (48%)
Male	72 (51%)	17 (24%)	15 (21%)	40 (55%)
Race/ethnicity				
White				
Black/African	56 (40%)	12 (23%)	15 (28%)	26 (49%)
American	44 (31%)	13 (29%)	9 (20%)	23 (51%)
Other/Hispanic	40 (29%)	10 (26%)	7 (18%)	22 (56%)
Socioeconomic status				
Low	87 (63%)	22 (26%)	19 (22%)	45 (49%)
High	51 (37%)	13 (27%)	12 (24%)	24 (49%)
Living Arrangement				
Both parents	44 (32%)	9 (21%)	11 (26%)	22 (52%)
Mother only	57 (42%)	14 (25%)	13 (23%)	30 (53%)
Other	36 (26%)	11 (31%)	6 (17%)	19 (53%)

Note: Chi-square tests of family meal frequency by demographic characteristics did not indicate any significant differences. SD = standard deviation.

^I Numbers may be reduced by varying amounts because of incidental missing data.

Table 2

Mean values and standard errors¹ of dietary practices by family dinner frequency for students attending alternative high schools (n = 139)².

Family meal frequency	Breakfast consumption (times per week)	Daily fruit servings (number of servings)	Daily vegetable servings (number of servings)	Daily fruit & vegetable servings (number of servings)	High fat food intake score (times per week)	Fast food intake (times per week)	Regular soda pop intake ³
Never	2.7 (0.48) ^a	1.2 (0.37) ^a	1.4 (0.47)	2.6 (0.71)	23.6 (2.0)	2.7 (0.30)	1.5 (0.11)
1–4 days/week	2.6 (0.51) ^a	1.4 (0.39) ^a	1.9 (0.49)	3.2 (0.76)	28.7 (2.2)	3.1 (0.32)	1.4 (0.12)
5–7 days/week	4.1 (0.39) ^b	2.4 (0.26) ^b	2.4 (0.34)	4.5 (0.53)	29.1 (1.5)	2.7 (0.21)	1.2 (0.08)

¹ All models adjusted for race/ethnicity, age, SES, gender, and random effect of school. In models with a significant effect for family meals, post hoc analyses were conducted and different superscripts (a/b) denote significantly different mean values (p < .05).

² Numbers may be reduced by varying small amounts because of incidental missing data.

³ 0 = less than weekly, 1 = weekly, 2 = daily

Table 3

Mixed model logistic regressions showing odds ratios (OR)¹ (95% confidence intervals (CI)) of overweight status, food insecurity and disordered eating by family dinner frequency for students attending alternative high schools (n = 139)².

Family meal frequency	Overweight status ^a OR (95% CI)	Food insecure ^b OR (95% CI)	Unhealthy weight loss ^c OR (95% CI)	Healthy weight loss ^d OR (95% CI)
Never	2.8 (1.1, 6.9)	6.0 (2.2, 16.4)	2.6 (0.9, 7.8)	1.4 (0.6, 3.2)
1–4 days/week	0.5 (0.2, 1.5)	2.2 (0.8, 6.7)	1.0 (0.3, 3.9)	1.3 (0.5, 3.2)
5–7 days/week (referent group)	1.0	1.0	1.0	1.0

¹ All models adjusted for race/ethnicity, age, SES, gender, and random effect of school, with the exception of the outcome of food insecurity which did not include adjustment for SES

² Numbers may be reduced by varying small amounts because of incidental missing data.

^a BMI > 85th percentile

^b 0 = no report of hunger, 1 = reported being hungry because family could not afford food

^c Report of fasting, diet aids, or self-induced vomiting/laxatives in past 30 days: 0 = no to all, 1 = yes to any

^d Report of exercising or adjusting food intake to lose or maintain weight: 0 = no to both, 1 = yes to either

Table 4

Mixed model linear regression showing mean values and standard errors¹ of substance use and depressive symptoms by family dinner frequency for students attending alternative high schools (n = 139)².

Family meal frequency	Substance use score (past year)	Depressive symptom score
Never	8.9 (0.58)	18.7 (0.74) ^a
1–5 days/week	8.8 (0.62)	17.4 (0.78) ^{ab}
6–7 days/week	7.5 (0.42)	16.3 (0.52) ^{ab}

¹ All models adjusted for race/ethnicity, age, SES, gender, and random effect of school. In models with a significant effect for family meals, post hoc analyses were conducted and different superscripts (a/b) denote significantly different mean values (p < .05).

² Numbers may be reduced by varying small amounts because of incidental missing data.