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 JOURNAL OF  
**ADOLESCENT  
 HEALTH**


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Original article

## Changes in the Frequency of Family Meals From 1999 to 2010 in the Homes of Adolescents: Trends by Sociodemographic Characteristics

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*Article history:* Received March 14, 2012; Accepted June 11, 2012

*Keywords:* Family meals; Adolescents; Secular trends; Disparities

### A B S T R A C T

**Objective:** To examine secular trends from 1999 to 2010 in family meal frequency in a population-based sample of adolescents across sociodemographic characteristics.

**Methods:** A repeated cross-sectional design was used. Participants were from middle schools and high schools in the Minneapolis/St. Paul area and included 3,072 adolescents (mean age = 14.6 ± 1.8 years) in 1999 and 2,793 adolescents (mean age = 14.4 ± 2.0 years) in 2010 from diverse ethnic/racial and socioeconomic backgrounds. Trends in family meal frequency were examined using inverse probability weighting to control for changes in sociodemographic characteristics over time.

**Results:** Family meal frequency remained fairly constant from 1999 to 2010 in the overall sample, but decreases were found in population subgroups including girls, middle school students (grade: 6–8), Asians, and youth from low socioeconomic backgrounds. Among youth from the lowest socioeconomic backgrounds, the mean number of family meals in the past week decreased from 4.0 in 1999 to 3.6 in 2010 ( $p = .003$ ). Furthermore, the percentage of youth from low socioeconomic backgrounds eating five or more meals in the past week decreased from 46.9% in 1999 to 38.8% in 2010 ( $p < .001$ ). In contrast, family meal frequency tended to increase over time among youth from higher socioeconomic backgrounds.

**Conclusions:** The widening gap in family meal frequency between youth from low and high socioeconomic backgrounds is concerning, particularly given the greater risk for poor health outcomes among low-income youth. Given findings from other studies suggesting multiple benefits of family meals, interventions to increase family meal frequency are needed that target adolescents and their families from the most vulnerable segments of the population.

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### IMPLICATIONS AND CONTRIBUTION

Little is known about how family meal frequency has changed over time. The current study examines secular trends in family meals from 1999 to 2010 among a diverse population of adolescents. This study further identifies subgroups of the population in greatest need of interventions to increase family meal frequency.

Research shows that more frequent family meals are associated with several positive outcomes in adolescents, including better dietary intake [1–10], fewer disordered eating behaviors

[11–16], higher levels of psychological well-being [14,17,18], less substance use [16,17,19,20], and better academic success [17]. Much of this research has been published in the past decade or so. The growing interest and scientific attention to family meals research is evident, in that approximately 25 scientific articles were published in the peer-reviewed literature before 1999, whereas over 125 articles were published between 1999 and 2011. Activities aimed at promoting family meals also appear to have increased over the past decade; for example,

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based on their research regarding the importance of family meals for preventing substance use, in 2001, the National Center on Addiction and Substance Abuse at Columbia University launched a national campaign promoting family meals in which 1 day a year is called Family Day—A Day to Eat Dinner with Your Children [21].

To advance the state of the science, it is now important to assess whether there have been trends in the frequency of family meals over time and to examine these trends across sociodemographic characteristics of adolescents. Although it is commonly stated that family meals have declined over time [22], we were unable to find any empirical data showing such a trend for families of adolescents. Nicklas et al found a decrease in the percentage of 10-year-old children eating a home dinner from 1973 to 1994 (89.2% to 75.9%), but did not report on family meals [23]. The only study identified that studied trends in family meal frequency over time was conducted by the National Center on Addiction and Substance Abuse at Columbia University [20]. In this study, the percentage of adolescents reporting five or more family meals per week remained fairly consistent in annual assessments conducted from 1999 to 2011, with slightly higher levels in 2011 (58%) than in 1999 (51%). However, trends were not reported for different subgroups of the adolescent population, which may be important for efforts targeting change. Cross-sectional research has indicated that the frequency of family meals differs across sociodemographic characteristics [1,24]. For example, in Project EAT-I (Eating and Activity in Teens), conducted in 1999, our research team found that family meal frequency differed across gender (higher in boys than in girls), school level (higher in middle schools students than high school students), ethnicity/race (highest in Asian Americans), and socioeconomic status (SES) (most frequent in youth from highest socioeconomic backgrounds) [1]. Exploring whether these differences have become smaller or larger over time may have important implications for interventions.

The current study addresses an important gap in the literature on family meals, in that it examines *secular trends* in family meal frequency within a large and diverse adolescent population. Trends are examined from 1999 to 2010, thus capturing a period in which there was an increase in the dissemination of information on family meals in both the scientific and popular media. Furthermore, the diverse nature of the sample allows for an examination of trends in family meal frequency by adolescents' sociodemographic characteristics, including gender, school level, ethnicity/race, and SES, all of which could be important to inform future interventions.

## Methods

### Study design and population

A repeated cross-sectional study design was used to compare family meal patterns between 1999 and 2010 among adolescent participants in Project EAT. Data from 1999 are from Project EAT-I, the first wave of a longitudinal study following adolescents into young adulthood [25–27]. Data from 2010 are from EAT 2010, a multilevel study in adolescents. Both studies were designed to assess variables of relevance to eating behaviors, physical activity patterns, and weight-related outcomes in participants. Study procedures were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee and by the research boards of the participating school

districts. At each wave, approximately 90% of adolescents who were at school on the days of survey administration had parental consent and chose to participate.

In Project EAT-I, participants included ethnically/racially and socioeconomically diverse students from 31 public schools in the Minneapolis/St. Paul metropolitan area of Minnesota [25,26]. For EAT 2010, a new cohort of students from 20 public schools in the same metropolitan area participated in the study. To facilitate the examination of secular trends, the earlier study sample was restricted to 27 schools from the two urban school districts that participated at both time points. At both time points, middle schools and high schools were included. Mean ages and standard deviations (SDs) of middle school youth were 12.8 (SD = .82) and 12.6 (SD = .83) in 1999 and 2010, respectively. Mean ages of high school participants were 16.0 (SD = .90) and 16.0 (SD = 1.29) in 1999 and 2010, respectively. The study sample included 3,072 adolescents in 1999 and 2,793 adolescents in 2010.

### Measures

Adolescents completed surveys in school classrooms for both study waves; all survey questions used in the current analysis were identical in 1999 and in 2010. We examined the test–retest reliability of survey questions in 161 diverse adolescents in 1999 and found good agreement [11]. In 2010, we again examined test–retest reliability of survey questions in 129 diverse adolescents; psychometric properties from 2010 are reported in this article.

To assess the frequency of family meals, adolescents were asked the question “During the past seven days, how many times did all, or most, of your family living in your house eat a meal together?” Response categories were never, 1–2 times, 3–4 times, 5–6 times, 7 times, or >7 times (test–retest  $r = .63$ ). Three variables were developed from this question for the current analysis and included *family meal frequency* (mean number of family meals in the past week), *infrequent family meals* (two or fewer family meals in the past week), and *frequent family meals* (five or more family meals in the past week) (test–retest agreement for both infrequent and frequent family meals = 82%).

Sociodemographic variables were reported by adolescents and included *gender*, *age*, *ethnicity/race*, and *SES*. *Ethnicity/race* was assessed with the question “Do you think of yourself as . . . ? 1) White, 2) Black or African American, 3) Hispanic or Latino, 4) Asian American, 5) Native Hawaiian or Pacific Islander, 6) American Indian or Native American, or 7) Other” (test–retest agreement = 98%–100%). As few adolescents reported “Hawaiian or Pacific Islander,” they were coded as “mixed/other” at both time points. A follow-up question asked about background (e.g., Hmong, Cambodian, Somali, Ethiopian) (test–retest agreement = 92%); of note, most of the Asian American adolescents reported that they were Hmong (weighted percentages: 76% in 1999 and 82% in 2010). *SES* was determined primarily using the higher education level of either parent, based on adolescent report (range: 1–5, test–retest  $r = .90$ ). To prevent the misclassification of participants as high SES based on education if their family had economic stress, an algorithm was developed that also took into account family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parental employment status [26,28].

### Statistical analysis

Tests for secular trends in frequency of family meals measured both as continuous and dichotomized variables were conducted using two-sample *t* tests and  $\chi^2$  tests, respectively. These tests comparing 1999 with 2010 were conducted stratified by gender, school level (middle school or high school), ethnicity/race, and SES, and used inverse probability weights [29] applied to the 1999 sample. Effect sizes were calculated for differences in mean family meal frequency; specifically, differences in mean family meal frequency between 1999 and 2010 were divided by the pooled SD of family meal frequency, which was 2.57. An effect size between .10 and .30 is usually considered small, although even small differences in trends at a population-based level can have important implications. A test for differential secular trends across SES categories was additionally conducted using linear binomial regression [30] with an SES by year interaction. Inverse probability weights were included for the 1999 sample in all analyses to control for demographic shifts in the study population and were calculated from a logistic regression of the year indicator on gender, school level, ethnicity/race, SES, and two-way interactions [29]. By weighting the 1999 sample, the secular trend tests are consequently controlled for demographic shifts that may have occurred over time. For example, in our comparison of the mean frequency of family meals in girls from 1999 and girls from 2010, the weighted distribution of school level, ethnicity/race, and SES in the 1999 sample of girls will match the distribution of those demographics in the 2010 sample so that differences can be attributed to secular changes rather than shifts in the demographics. Proper control of the demographic shift using this weighting method was achieved, as evidenced by the nonsignificant differences in the weighted 1999 sample compared with the 2010 sample (Table 1) and fuller description in a previous publication [31]. All analyses were performed in SAS 9.2 (SAS Institute, Cary, NC).

### Results

Findings suggest that in the overall sample of adolescents, the mean number of family meals remained fairly constant from 1999 to 2010 ( $p = .054$ ; effect size =  $-.05$ ), with trends differing across sociodemographic characteristics (Table 2). Statistically significant decreases were found in adolescent girls, middle school students, Asian adolescents, and youth from low socioeconomic backgrounds. For example, the percentage of middle school students reporting infrequent family meals (i.e., two or fewer meals in the past week) increased from 24.2% in 1999 to 30.3% in 2010 ( $p < .001$ ). Among the Asian adolescents (primarily Hmong in the study population), the percentage of youth reporting infrequent family meals increased from 24.2% to 30.3% ( $p < .001$ ).

Findings further suggest that disparities in family meal practices across SES are widening. Among youth from the lowest socioeconomic backgrounds, the mean number of family meals in the previous week decreased from 4.0 in 1999 to 3.6 in 2010 ( $p = .003$ ; effect size =  $-.14$ ), and the percentage of youth from low socioeconomic backgrounds eating infrequent family meals increased from 31.8% in 1999 to 38.8% in 2010 ( $p = .003$ ). In contrast, family meal frequency tended to increase among youth from higher socioeconomic backgrounds. Specifically, among youth from the high-middle SES group, the mean number of family meals in the past week increased from 4.2 in 1999 to 4.5 in 2010 ( $p = .039$ ; effect size =  $.14$ ), and the percentage of youth from high-middle SES group eating infrequent family meals decreased from 29.5% in 1999 to 23.7% in 2010 ( $p = .032$ ).

Figure 1 shows the growing disparity in the prevalence of frequent family meals (five or more/past week) across the five levels of SES. In both 1999 and 2010, fewer families from the lowest SES level ate frequent family meals than families from the highest SES level; however, the disparity between these groups grew from 8.9% in 1999 to 22.5% in 2010. This growing

**Table 1**

Comparisons of sociodemographic characteristics in actual 1999, weighted 1999, and actual 2010 samples from Minneapolis/St. Paul used to examine secular trends in family meals<sup>a</sup>

Sociodemographic characteristics	1999 sample		Weighted 1999 sample		2010 sample		<i>p</i> value <sup>b</sup>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Gender							.968
Male	1,499	48.8	1,436	46.7	1,307	46.8	
Female	1,573	51.2	1,636	53.3	1,486	53.2	
Ethnicity/race							.999
White	1,029	33.5	587	19.1	525	18.8	
Black	723	23.6	885	28.8	808	28.9	
Asian	753	24.5	615	20.0	555	19.9	
Hispanic	243	7.9	513	16.7	472	16.9	
Native American	133	4.3	110	3.6	102	3.7	
Mixed/other	191	6.2	362	11.8	331	11.8	
SES							.999
Low	683	22.2	1,168	38.0	1,072	38.4	
Low-middle	601	19.5	655	21.3	595	21.3	
Middle	755	24.6	521	16.9	471	16.9	
High-middle	513	16.7	388	12.7	347	12.4	
High	358	11.7	224	7.3	203	7.3	
Not reported	162	5.3	116	3.8	105	3.7	
Age in years: mean (SD)	3,072	14.6 (1.8)	3,072	14.5 (1.8)	2,793	14.4 (2.0)	.255

SES = socioeconomic status.

<sup>a</sup> The weighted 1999 sample used inverse probability weighting [32] based on the odds of being in the 2010 sample given the demographics. Weighting was done to allow for an examination of secular trends in weight-related outcomes independent of demographic shifts in the population (see text in Statistical analysis section). Both the unweighted and weighted 1999 demographics are provided for ease of comparison.

<sup>b</sup> *p* values are presented for differences between the weighted 1999 and 2010 samples, based on  $\chi^2$  tests for gender, ethnicity/race, and SES, and *t* tests for age.

**Table 2**  
Ten-year secular trends in family meal frequency from 1999 to 2010 in a population-based sample of adolescents by sociodemographic characteristics

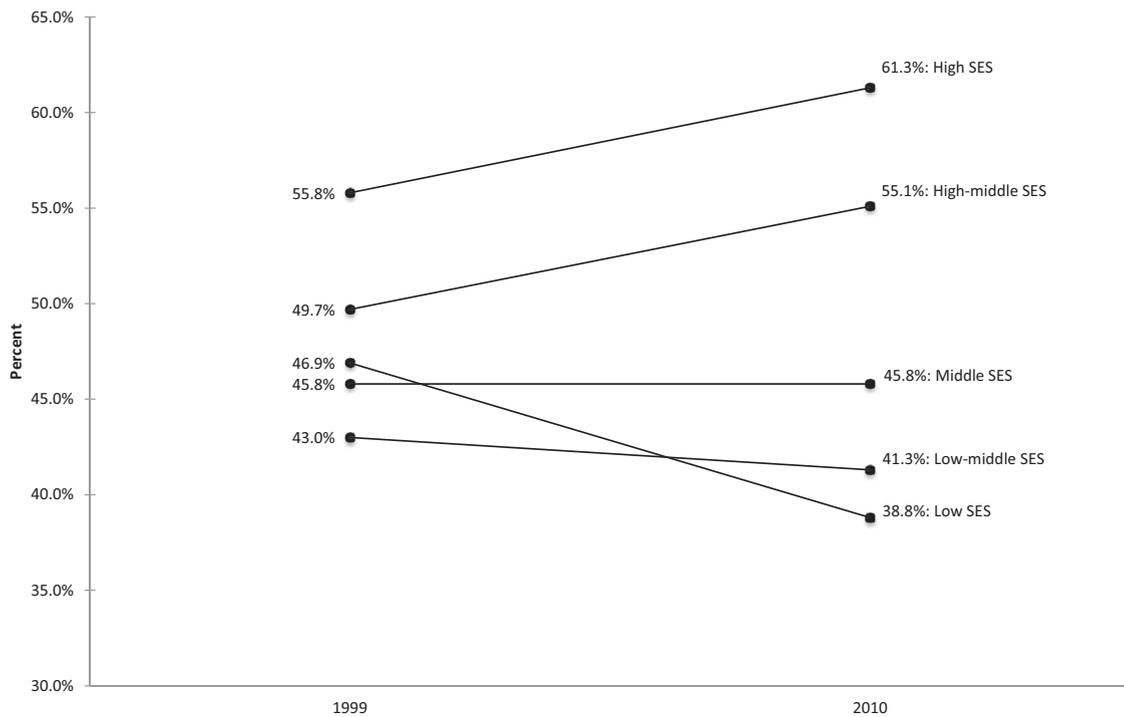
Sociodemographic characteristics	1999 n <sup>a</sup>	2010 n	Number of family meals: past week (mean)				Infrequent family meals (≤2 times/past week) (%)			Frequent family meals (≥5 times/past week) (%)		
			1999 <sup>a</sup>	2010	ES <sup>b</sup>	p value	1999	2010	p value	1999	2010	p value
Total sample	3,072	2,793	4.03	3.90	-.05	.054	31.9	34.5	.041	47.2	44.4	.035
Gender												
Boys	1,436	1,307	4.08	4.04	-.02	.618	30.2	31.7	.397	48.1	46.6	.425
Girls	1,636	1,486	3.98	3.78	-.08	.032	33.4	36.9	.047	46.4	42.5	.033
School level												
Middle school	1,431	1,287	4.59	4.21	-.15	<.001	24.2	30.3	<.001	56.9	50.4	<.001
High school	1,641	1,506	3.54	3.63	.04	.331	38.7	38.0	.714	38.7	39.3	.735
Ethnicity/race												
White	587	525	4.02	4.24	.09	.092	31.4	28.1	.180	47.0	51.1	.120
Black	885	808	3.59	3.67	.03	.567	40.5	38.7	.485	41.8	40.7	.668
Hispanic	513	472	3.92	4.04	.05	.546	30.2	34.1	.289	43.6	46.1	.539
Asian	615	555	4.69	3.95	-.29	<.001	22.8	31.9	<.001	57.8	43.3	<.001
Native American	110	102	4.34	3.73	-.24	.083	29.4	39.6	.106	55.6	43.6	.069
Mixed/other	362	331	4.00	3.65	-.14	.137	31.4	37.8	.149	44.5	42.2	.608
SES												
Low	1,168	1,072	3.99	3.62	-.14	.003	31.8	38.8	.003	46.9	38.8	<.001
Low-middle	655	595	3.82	3.72	-.04	.513	35.7	38.1	.399	43.0	41.3	.559
Middle	521	471	3.96	3.92	-.02	.786	34.1	33.8	.923	45.8	45.8	.998
High-middle	388	347	4.17	4.53	.14	.039	29.5	22.9	.032	49.7	55.1	.125
High	224	203	4.48	4.71	.09	.268	23.8	23.7	.986	55.8	61.3	.200

<sup>a</sup> The 1999 sample was weighted to allow for an examination of secular trends in weight-related outcomes independent of demographic shifts in the population. For example, the test comparing family meals within the low SES group between 1999 and 2010 is mutually controlled so that gender, school level, ethnicity/race, and SES makeup are the same in the low SES group in the 1999 sample as in the 2010 sample.

<sup>b</sup> ES = effect size is calculated as the difference in mean family meal frequency between 1999 and 2010 divided by the pooled standard deviation of family meal frequency, which was 2.57.

disparity was primarily due to a large decline in the percentage of low SES families having frequent family meals (46.9% in 1999 to 38.8% in 2010;  $p < .001$ ). The nonsignificant trends toward an increase in frequent family meals among the higher

SES families also contributed to the growing disparity across SES. For example, among the highest SES families, frequent family meals were reported by 55.8% of the adolescents in 1999 and 61.3% in 2010 ( $p = .200$ ).



**Figure 1.** Percent of families eating a family meal  $\geq 5$  times/past week in 1999 and 2010 by socioeconomic status (SES).  $p = .004$  for test of interaction between time and SES (4 degrees of freedom).

## Discussion

The aim of the current study was to examine secular trends in family meal frequency from 1999 to 2010. Findings indicate that the frequency of family meals tended to remain constant or decrease during this period. It is concerning that at both time points, many adolescents report infrequent family meals; one-third of adolescents (31.9% in 1999 and 34.5% in 2010) had two or fewer family meals in the past week. Of further concern, decreases often occurred in the sectors of the population most vulnerable to poor nutrition and other developmental risk factors, particularly youth from low SES families. Given the consensus of research findings that strongly suggest the importance of family meals for the well-being of adolescents [20,32–34], it is important to ensure that more adolescents eat meals with their families and that interventions to increase family meals reach out to and are designed to meet the needs of all sectors of the population.

The different patterns for trends in family meals across sociodemographic characteristics of adolescents are disturbing, in that decreases in family meal frequency were often found in the most vulnerable groups, for whom family meals may be most important. There was a small decrease in family meal frequency among girls, which is of concern given past research showing that family meals have particular benefits for girls. For example, in previous longitudinal studies using data from Projects EAT I and II, more frequent family meals in adolescence predicted lower levels of substance use [19] and disordered eating behaviors [12] 5 years later in girls, but not in boys. The decline in family meals among younger adolescents is similarly of concern, given the importance of healthy nutrition during this period of rapid growth [29,35]. Furthermore, the developmental challenges facing middle school youth make family support particularly important; although families have opportunities outside of the family meal to provide support for their children, the family meal provides a structured framework for regular contact and communication [36]. The present study findings showing a decrease in family meal frequency among Asian youth parallels a large secular increase in the prevalence of obesity among Asian boys in this sample, shown in a previous publication [31]. In this previous analysis of trends in weight-related outcomes, the prevalence of obesity increased from 21.2% in 1999 to 33.5% in 2010 among Asian boys. In contrast, the prevalence of obesity among white boys stayed constant during this period (18.1% in 1999 and 18.3% in 2010). Of note, the Asian population in the EAT population is primarily Hmong, and a high percentage of the Hmong adolescents come from low socioeconomic backgrounds. Although a causal contribution to this trend in obesity cannot be discerned from these analyses, a meta-analysis found that family meals were associated with better dietary quality across studies and were protective against obesity in some studies [34].

Of particular concern were the growing disparities in family meal frequency across SES. The decline in family meal frequency among adolescents from low SES families suggests that these families are facing difficulties in making family meals happen on a regular basis. Although it is beyond the scope of this study to determine what these difficulties are and how they have changed over time, we speculate that obstacles to family meals include factors related to economic stresses, such as increased unemployment and underemployment, a need to work multiple part-time jobs to make ends meet, decreased food security, smaller living spaces that are not conducive to shared eating,

changes in workplace demands that allow for less flexibility in time schedules, and related time stressors [37,38]. The growing disparity in family meal frequency is also due to the trends toward increasing family meals in youth from higher SES families. This increase was statistically significant in the high-middle SES families, suggesting that messages regarding the importance of family meals and strategies for overcoming obstacles to family meals may be reaching these families.

The current study contributes to the extant literature on family meals in its examination of secular trends in family meals in the homes of adolescents from diverse backgrounds. The unique repeated cross-sectional study design allowed for the study of secular trends from 1999 to 2010, a period during which much attention was directed toward family meals and their associations with a number of positive outcomes in adolescents. The large and diverse study population allowed for comparisons of trends in family meal frequency in different subgroups of the population. We were only able to identify one other study that examined secular trends in family meal frequency in the homes of adolescents, and trends were not examined within subgroups of youth [20]. Given that a majority of the Asian adolescents in the EAT population in both 1999 and 2010 were Hmong, this study allowed for a unique opportunity to examine trends in this subgroup of the population. Nevertheless, extrapolations should not be made to other Asian populations. Furthermore, as data were collected in one urban area, generalizations to youth from other areas should be made cautiously. Finally, although data were collected in the same school districts in both 1999 and 2010, there were demographic shifts in the population. Given these shifts, all analyses used inverse probability weighting so that the 1999 sample was matched demographically to the 2010 sample. This matching was done to ensure that identified trends were not merely a function of the demographic changes in the population.

Future research should examine whether similar trends in family meals have occurred in different populations across the United States and other countries. The decreasing frequency of family meals found in the Asian adolescents, who are primarily Hmong, is likely due to acculturation into U.S. society (51% of the Hmong youth in the 1999 EAT sample were born in the United States as compared with 82% of the Hmong youth in the 2010 sample), suggesting a need for examining family meal trends in other immigrant population groups. Research is also needed to explore the reasons for the trends identified in the current study, particularly what factors led to decreases in the low SES families and what factors led to increases in some of the higher SES families. It is also of interest to examine how family meals have changed over time in terms of the types of foods being served, who is eating together, and what the family meal looks like (e.g., eating at the table or elsewhere, conversations, length of meals). Of most urgency is a need to determine how best to reach the most vulnerable sectors of the population with interventions most likely to meet their needs and increase the frequency of family meals.

This study showed that despite the increased attention that has been given to family meals in the scientific literature and popular media, the frequency of family meals either remained constant or decreased in the homes of adolescents from 1999 to 2010. More work is needed to ensure the adequate dissemination of these findings to families and their translation into effective interventions. Given the decreases in family meals among low SES families, it is crucial to identify and use dissemination

outlets that reach low SES populations. Realistic interventions that meet the needs of families facing numerous stresses on their time and budgets are also needed. Public health interventionists and policy makers should continue to focus messages and interventions around family meals to the more vulnerable sectors of the population [39]. Such interventions may include community-based programs for families [40], the resurrection of home economics classes within schools that provide adolescents with the skills to contribute to the preparation of family meals, and workplace and sport team policies that allow families to spend time together at mealtimes. Dietitians discussing family meals within clinic or public settings are encouraged to provide ideas about how to make simple, affordable, and healthful family meals. Other health care providers working with adolescents and their families are also encouraged to inquire about family meal frequency, discuss the importance of family meals, explore obstacles to family meals, and elicit strategies for overcoming these barriers.

### Acknowledgments

The project described was supported by grant number R01HL084064 (D.N.S., principal investigator) from the National Heart, Lung, and Blood Institute. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Heart, Lung, and Blood Institute or the National Institutes of Health.

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