

# Secular Trends in Fast-Food Restaurant Use Among Adolescents and Maternal Caregivers From 1999 to 2010

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National data for adolescents and adults indicate that foods consumed away from home, as well as a growing proportion of those consumed at home, are frequently purchased at fast-food restaurants.<sup>1-3</sup> These patterns are of public health concern as numerous studies have linked frequent consumption of fast food to weight gain and poor diets.<sup>4-6</sup> In contrast to the nutritional consequences associated with fast food, research suggests that adolescents and parents who regularly eat together at mealtimes tend to have better diets.<sup>7-12</sup> Despite some evidence of socioeconomic and racial/ethnic disparities in the healthfulness of foods prepared at home and served at family meals,<sup>13</sup> this relationship between family meals and dietary intake likely represents greater exposure to healthful foods at shared mealtimes. Frequently purchasing fast food for family meals may compromise these nutrition-related benefits.<sup>14-18</sup>

National data on adolescent dietary patterns also indicate that the proportion of energy from foods prepared at fast-food restaurants but consumed at home has increased in recent decades<sup>2</sup>; thus, it is important to examine whether parallel changes have occurred in the frequency of purchasing fast food for family meals. This information along with complementary data for adolescents and their parents on trends in overall fast-food consumption may have important implications for interventions. To the best of our knowledge, no previous studies have examined secular trends in purchasing fast food for family meals or secular changes in fast-food consumption among parents who serve as role models for their children. The most recent published data on secular changes in adolescent fast-food consumption do not describe trends beyond 2008.<sup>2,3</sup>

We designed the current study to help fill these research gaps and guide the development of strategies to support adolescents and their

**Objectives.** We examined trends from 1999 to 2010 in adolescents' self-reported fast-food restaurant use alongside maternal reports of fast-food consumption and purchasing from restaurants for family meals.

**Methods.** Middle- and high-school student participants from Minneapolis–St Paul, Minnesota, represented diverse ethnic/racial and socioeconomic backgrounds. Adolescents completed classroom-administered surveys and maternal caregivers responded by phone or mail.

**Results.** The overall prevalence of frequent fast-food consumption, defined as 3 or more times per week, decreased from 1999 to 2010 among adolescents (1999: 25%; 2010: 19%;  $P < .001$ ) and maternal caregivers (1999: 17%; 2010: 11%;  $P < .001$ ), but sociodemographic disparities were apparent. For example, the prevalence of frequent fast-food consumption remained highest and did not significantly decrease among Black or Native American youths. The overall prevalence of frequent fast-food purchases for family meals did not significantly decrease; large decreases were observed only among Hispanic families (1999: 18%; 2010: 6%;  $P < .001$ ).

**Conclusions.** In light of previous findings linking frequent fast-food consumption to greater weight gain and poor nutrition, the observed decreases in consumption are encouraging and interventions are needed to address observed disparities. (*Am J Public Health.* 2014;104:e62–e69. doi:10.2105/AJPH.2013.301805)

families in sharing mealtimes while limiting consumption of foods prepared at fast-food restaurants. The aim was to examine secular trends in adolescent reports of fast-food consumption alongside maternal reports of their own fast-food consumption and purchasing for family meals. We examined trends from 1999 to 2010 in a large, diverse population-based sample, and therefore capture a period in which there was growing attention given to the large portions and high energy density of fast-food restaurant menu items.<sup>19,20</sup> In addition, the diversity of the sample allowed for investigation of these trends by sociodemographic characteristics as any identified differences may be important to consider in the tailoring of interventions.

## METHODS

We used a repeated cross-sectional design to compare fast-food restaurant use between

1999 and 2010 among adolescents and maternal caregivers participating in Project EAT (Eating and Activity in Teens). We drew 1999 data from Project EAT-I, the first wave of a longitudinal study that followed adolescents into young adulthood.<sup>21-24</sup> We drew 2010 data from EAT 2010, a multicontextual study in adolescents.<sup>25</sup> For both waves, classroom-administered surveys were completed by adolescents from public middle and high schools and data were collected from caregivers as will be described in detail. At each wave, approximately 90% of adolescents who were at school on survey administration days had parental consent and chose to participate.

In 1999, participants included ethnically/racially and socioeconomically diverse students from 31 schools in the Minneapolis–St. Paul metropolitan area of Minnesota.<sup>21,22</sup> Consideration was given to enrollment size and involvement in other research studies when recruiting school districts. In recruiting a new

cohort of students during the 2009–2010 academic year, schools that had participated in 1999 were given priority; however, enrolling an ethnically/racially diverse sample was also of concern. Therefore, we included only 2 urban school districts, which served a large number of schools and diverse students. To facilitate the examination of secular trends, we restricted the earlier sample to the 2 school districts that had schools participating at both time points ( $n = 27$  schools in 1999 and  $n = 20$  schools in 2010). The study sample included 3072 adolescents (51.2% female) in 1999 and 2793 adolescents (53.2% female) in 2010. The mean age of the 1999 sample was 14.6 years ( $SD = 1.8$ ), and the mean age of the 2010 sample was 14.4 years ( $SD = 2.0$ ).

### Adolescent Surveys

Trained research staff administered surveys during selected health, physical education, and science classes; all items used in the current analysis were identical in 1999 and 2010. Surveys were pretested with separate samples of ethnically/racially diverse adolescents before survey administration to ensure readability and relevance.<sup>22,26</sup> To assess fast-food consumption, adolescents were asked “In the past week, how often did you eat something from a fast food restaurant (like McDonald’s, Burger King, Hardee’s, etc.)?”<sup>27–29</sup>

Adolescents also reported sociodemographic variables, including gender, age, ethnicity/race, and parental socioeconomic status (SES). We determined SES primarily by using the higher education level of either parent based on adolescent report. To prevent the misclassification of participants as high SES on the basis of education if their family had economic stress, we developed an algorithm that took into account family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parental employment status.<sup>21,30</sup> These indicators of economic stress modified the education-based SES measure for 47% of the 1999 sample and 65% of the 2010 sample. The education-based SES measure was validated in the 2010 sample by comparing classifications based on adolescent report to parental report of household income when available. Parental report of household income corresponded to SES classification with those in the lowest category having a mean household

income of less than \$30 000 and those in the highest category having a mean household income of more than \$75 000.

### Parent and Caregiver Surveys

Parents and caregivers of adolescent participants were surveyed at each wave. In 1999, a stratified random sample of adolescents was selected to represent each ethnic/racial subgroup and to have a parent interviewed for a total of 902 parent (90% female) phone interviews completed.<sup>31</sup> In 2010, parents of all adolescent participants were asked to respond to a similar survey by mail or phone.<sup>32</sup> A total of 3709 parents provided informed consent and participated. The current analysis included data from only primary female parent respondents in 2010 ( $n = 2230$ ) and in 1999 ( $n = 802$ ) to facilitate the examination of secular trends.<sup>13</sup> All female parents and caregivers are hereafter referred to as “mothers.”

To assess maternal fast-food consumption, mothers were asked “In the past week, how often did you eat something from a fast-food restaurant such as McDonald’s, Burger King, Domino’s, or similar places? (pizza counts).”<sup>16</sup> Similarly, to assess purchasing of fast food for family meals, mothers were asked the question “During the past week, how many times was a family meal purchased from a fast-food restaurant and eaten together either at the restaurant or at home? (pizza counts).”<sup>16</sup> We conducted cultural relevance and item pre-testing.<sup>13</sup>

Household sociodemographic characteristics reported by mothers included ethnicity/race and educational attainment. Educational attainment was assessed by asking “What is the highest grade or year of school that you have completed?” A similar question assessed educational attainment of the mother’s spouse or partner to allow for a determination of the higher education level of either parent within each household. This measure of household education was used in analyses to be parallel with the adolescent-reported measure of parental SES.

### Statistical Analysis

For all fast-food outcomes of interest, we developed 2 variables for analysis and included fast-food frequency (mean number of times purchased or consumed in the past week)

and frequent fast food use (purchased or consumed 3 or more times in the past week) as defined in other research.<sup>16,28,29,33</sup> We conducted tests for secular trends in fast-food outcomes with the 2-sample  $t$  test and  $\chi^2$  test, respectively. To examine adolescent fast-food consumption, we stratified tests comparing 1999 with 2010 by gender, school level (middle or high school), ethnicity/race, and parental SES. Similarly, for maternal reports of fast-food consumption and purchasing of fast food for family meals, we stratified tests comparing 1999 with 2010 by ethnicity/race and household educational attainment. We calculated effect sizes for differences in mean fast-food frequency; specifically, we divided differences in mean frequencies between 1999 and 2010 by the corresponding pooled standard deviation. Finally, we conducted sensitivity analyses to confirm that observed trends in adolescent fast-food consumption were similar regardless of whether all youths were included or only those with matching maternal survey data; given comparable findings, we retained all youths for the results presented here.

Models included inverse probability weights for the 1999 adolescent or maternal sample as appropriate to the analysis of an adolescent-reported or mother-reported outcome to control for demographic shifts in the study population. We calculated probability weights for the adolescent sample from a logistic regression of the year indicator on gender, school level, ethnicity/race, parental SES, and all possible 2-way interactions and for the maternal sample were calculated from a logistic regression of the year indicator on ethnicity/race and household education.<sup>34</sup> By weighting the 1999 samples, we consequently controlled the secular trend tests for demographic shifts that may have occurred over time. We achieved proper control of the demographic shift by using this weighting method, as evidenced by the nonsignificant differences observed by gender, age, ethnicity/race, parental SES, and household education when we compared the weighted 1999 samples with the corresponding 2010 samples. A fuller description of the weighted adolescent sample has previously been published,<sup>25</sup> and a description of the weighted maternal sample is shown in Table 1. Because ethnicity/race and SES data were missing for small percentages of

**TABLE 1—Comparison of Sociodemographic Characteristics for Mothers of Adolescents in Actual 1999, Weighted 1999, and Actual 2010 Samples From Minneapolis–St Paul, MN: Project EAT**

Characteristic	1999 Sample, No. (%)	Weighted 1999 Sample, No. (%)	2010 Sample, No. (%)	<i>P</i> <sup>a</sup>
Ethnicity/race <sup>b</sup>				.67
White	373 (46.5)	247 (30.8)	662 (29.7)	
Black	186 (23.2)	232 (28.9)	630 (28.2)	
Hispanic	76 (9.5)	115 (14.3)	371 (16.6)	
Asian	107 (13.3)	161 (20.1)	438 (19.7)	
Mixed/other	60 (7.5)	47 (5.9)	129 (5.8)	
Highest household education				.8
Did not finish high school	87 (10.9)	167 (20.8)	512 (23.0)	
Finished high school	185 (23.1)	181 (22.6)	485 (21.8)	
Some college	288 (35.9)	232 (28.9)	629 (28.2)	
Finished college	127 (15.8)	146 (18.3)	398 (17.8)	
Advanced degree	115 (14.3)	76 (9.4)	206 (9.2)	

Note. Project EAT = Eating and Activity in Teens. The weighted 1999 sample used inverse probability weighting 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 fast-food restaurant use 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>a</sup>*P* values are presented for differences between the weighted 1999 and 2010 samples, based on the  $\chi^2$  test for ethnicity/race and household education.

<sup>b</sup>Mothers could choose more than 1 ethnic/racial category; those responses indicating multiple categories were coded as mixed/other. Because there were few participants who identified themselves as Hawaiians, Pacific Islanders, or Native Americans, these participants were also included in the mixed/other category.

adolescents (0.3%–5.3%), we also used imputation for the analysis of trends among youths. We performed all analyses with SAS version 9.3 (SAS Institute Inc, Cary, NC).

## RESULTS

Findings suggest that, in the overall sample of adolescents, the mean frequency of fast-food consumption decreased modestly from 1999 to 2010 ( $P < .001$ ; effect size =  $-0.14$ ); similar trends occurred among boys and girls and in middle- and high-school grades but trends differed across ethnic/racial and socioeconomic subgroups (Table 2). In both years, fast-food consumption was highest among youths who reported their ethnicity/race as Black, Native American, or mixed/other. Whereas fast-food consumption decreased over time among White, Hispanic, Asian, and mixed/other youths, it remained high (at an average frequency of nearly 2 times/week) among Black and Native American youths. Mean changes in fast-food consumption indicated significant decreases

over time for all socioeconomic subgroups with the exception of those in the lowest SES category.

Overall, the percentage of youths reporting frequent fast-food consumption (i.e.,  $\geq 3$  times in the past week) was 25% in 1999 and decreased to 19% by 2010 ( $P < .001$ ). We did not observe secular increases among any sociodemographic subgroup; however, significant secular decreases in frequent fast-food consumption did not occur among Black or Native American youths. In 2010, the prevalence of frequent fast-food consumption among Black (27%) and Native American (23%) youths was approximately double the prevalence among Asian (12%) and White (13%) youths.

In line with the findings for adolescent fast-food consumption, the mean frequency of fast-food consumption decreased modestly from 1999 to 2010 in the overall sample of maternal caregivers ( $P = .03$ ; effect size =  $-0.14$ ) with trends differing across sociodemographic characteristics (Table 3). Fast-food consumption was lowest in both years among Asian mothers. We found the

higher fast-food frequencies reported by White and Hispanic mothers in 1999 to decrease over time; however, we did not observe secular decreases among mothers who indicated that their ethnicity/race was Black or mixed/other. Trends in fast-food consumption according to household education did not show an ordered pattern. Fast-food consumption decreased over time only among households in which the highest degree completed was high school and among households in which the highest degree completed was an advanced degree (e.g., master's or doctorate degree).

The percentage of mothers reporting frequent fast-food consumption was 17% in 1999 and decreased to 11% by 2010 ( $P < .001$ ). Across the ethnic/racial subgroups, we observed a statistically significant decrease in frequent consumption only among Hispanic mothers. The percentage of Hispanic mothers who reported frequent consumption decreased by two thirds from 1999 to 2010. Results stratified on household education paralleled the pattern of results reported for mean maternal consumption frequency.

Findings regarding the frequency of purchasing fast food for family meals indicated a modest mean decrease from 1999 to 2010 ( $P = .02$ ; effect size =  $-0.10$ ) in the overall sample and sociodemographic disparities paralleled those observed for maternal fast-food consumption (Table 4). The percentage of mothers reporting frequent purchases of fast food for family meals was 9% in 1999 and 7% in 2010 ( $P = .37$ ). Across the ethnic/racial subgroups, we observed a statistically significant decrease in frequent fast-food purchases for family meals only among Hispanic mothers.

## DISCUSSION

We aimed to examine changes from 1999 to 2010 in adolescent fast-food consumption alongside maternal reports of their own fast-food consumption and purchasing for family meals. Findings indicated that the frequency of fast-food consumption decreased among adolescents and mothers in the overall population, and there was a corresponding modest decrease in the frequency of purchasing fast food for family meals. These trends are encouraging when one considers what is known regarding the nutritional consequences of

**TABLE 2—Secular Trends in Adolescent Fast-Food Restaurant Use From 1999 to 2010 in a Population-Based Sample by Sociodemographic Characteristics: Minneapolis–St Paul, MN, Project EAT**

Characteristic	1999 No. <sup>a</sup>	2010 No.	Fast-Food Restaurant Use: Past Week Frequency				Frequent Fast-Food Restaurant Use (≥ 3 Times in Past Week)		
			1999, <sup>a</sup> Mean	2010, Mean	ES <sup>b</sup>	P	1999, <sup>a</sup> %	2010, %	P
Total sample	3072	2793	1.82	1.60	-0.14	< .001	25.1	18.7	< .001
Gender									
Boys	1436	1307	1.79	1.60	-0.12	.003	24.2	18.6	< .001
Girls	1636	1486	1.84	1.60	-0.15	< .001	25.8	18.7	< .001
School level									
Middle school	1428	1444	1.72	1.49	-0.14	< .001	22.6	16.0	< .001
High school	1644	1349	1.90	1.72	-0.11	.003	27.2	21.5	< .001
Ethnicity/race <sup>c</sup>									
White	587	525	1.50	1.28	-0.14	.02	17.8	12.8	.02
Black	885	808	2.08	1.95	-0.08	.12	30.3	26.7	.11
Hispanic	513	472	1.85	1.61	-0.14	.02	24.2	17.0	.005
Asian	615	555	1.54	1.29	-0.15	.01	20.7	11.7	< .001
Native American	110	102	2.04	1.86	-0.11	.42	28.9	22.6	.29
Mixed/other	295	322	2.13	1.69	-0.27	.001	33.8	21.2	< .001
Parental SES <sup>d</sup>									
Low	1168	1072	1.83	1.74	-0.05	.2	25.8	20.8	.006
Low-middle	655	595	1.85	1.62	-0.13	.02	24.3	19.8	.06
Middle	521	471	1.92	1.57	-0.21	.001	26.9	17.9	.001
High-middle	388	347	1.79	1.44	-0.21	.005	24.8	16.1	.004
High	224	203	1.48	1.12	-0.22	.02	18.5	9.9	.01

Note. ES = effect size; Project EAT = Eating and Activity in Teens; SES = socioeconomic status.

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

<sup>b</sup>ES is calculated as the difference in mean fast-food restaurant use frequency between 1999 and 2010 divided by the pooled SD of fast-food restaurant use frequency, which was 1.66.

<sup>c</sup>Adolescents could choose more than 1 ethnic/racial category; those responses indicating multiple categories were coded as mixed/other. Because there were few participants who identified themselves as Hawaiians or Pacific Islanders these participants were also included in the mixed/other category.

<sup>d</sup>SES was determined primarily by using the higher education level of either parent based on adolescent report. To prevent misclassification as high SES on the basis of education, we developed an algorithm that took into account family eligibility for public assistance, eligibility for free or reduced-cost school meals, and parental employment status.<sup>2,30</sup>

frequent fast-food consumption.<sup>16,27,33,35</sup> However, in 2010 there were still nearly 19% of adolescents and 12% of mothers who reported consuming fast food from restaurants on 3 or more occasions in the past week.

Of further concern, fast-food consumption and purchases for family meals remained highest and did not decrease among some ethnic/racial subgroups most vulnerable to poor nutrition and the development of obesity. Whereas significant decreases in fast-food restaurant use were observed among White and Hispanic adolescents and mothers, similar improvements were not observed among those of Black or Native American race. The findings suggest the need to address disparities in the availability of fast-food restaurants and the fundamental causes of disparities (e.g.,

residential segregation) as well as for research to inform and conduct evaluations of culturally specific strategies to promote at-home preparation of healthful meals.<sup>36</sup>

Several studies have described increases in the consumption of food prepared away from home, particularly from fast-food restaurant sources, which have occurred over the past few decades.<sup>2,29,37–40</sup> A small number of studies have subsequently documented a halting or reversal of these trends in the past 10 years.<sup>3,41</sup> For example, one study that used National Health and Nutrition Examination Survey (NHANES) data on approximately 2000 adolescents and nearly 3000 adults (aged 20–64 years) observed no changes in the prevalence of fast-food consumption on a particular day or caloric intake from fast-food restaurants

between 2003–2004 and 2007–2008.<sup>3</sup> The results of the current study suggesting modest decreases in weekly fast-food consumption frequency align with national data and extend previous investigations of intake trends to 2010. These trends have occurred despite continued growth in the availability of limited-service restaurants between 1999 and 2010.<sup>42,43</sup>

Results of the current study add further to what is known about trends in fast-food consumption by reporting changes over time within population subgroups and by focusing on mothers who are role models as well as gatekeepers for the foods served at family meals. Of note, the observed disparities in fast-food consumption correspond with an extensive literature documenting

**TABLE 3—Secular Trends in Maternal Fast-Food Restaurant Use From 1999 to 2010 by Sociodemographic Characteristics: Minneapolis-St Paul, MN, Project EAT**

Characteristic	1999, No. <sup>a</sup>	2010, No.	Fast-Food Restaurant Use: Past Week Frequency				Frequent Fast-Food Restaurant Use (≥ 3 Times in Past Week)		
			1999, <sup>a</sup> Mean	2010, Mean	ES <sup>b</sup>	P	1999, <sup>a</sup> %	2010, %	P
Total sample	802	2221	1.42	1.24	-0.14	.03	16.8	11.3	<.001
Ethnicity/race <sup>c</sup>									
White	247	660	1.46	1.25	-0.15	.04	15.4	11.8	.15
Black	232	627	1.61	1.54	-0.05	.49	22.6	17.7	.11
Hispanic	115	371	1.80	1.23	-0.41	<.001	27.7	7.8	<.001
Asian	161	436	0.83	0.76	-0.05	.56	3.9	3.7	.88
Mixed/other	47	127	1.39	1.31	-0.06	.55	12.8	12.6	.98
Highest household education									
Did not finish high school	167	510	1.01	1.09	0.07	.5	13.3	8.0	.04
Finished high school	181	484	1.69	1.31	-0.35	.001	21.2	10.3	<.001
Some college	232	623	1.60	1.46	-0.13	.17	19.9	17.5	.42
Finished college	146	398	1.34	1.19	-0.14	.26	11.4	11.3	.97
Advanced degree	76	206	1.28	0.85	-0.40	.02	15.3	2.4	<.001

Note. ES = effect size; Project EAT = Eating and Activity in Teens.

<sup>a</sup>The 1999 sample was weighted to allow for an examination of secular trends in fast-food restaurant use independent of demographic shifts in the population. For example, the test comparing fast-food restaurant use within the group that did not finish high school between 1999 and 2010 is mutually controlled so that ethnicity/race makeup is the same in this group in the 1999 sample as in the 2010 sample.

<sup>b</sup>ES is calculated as the difference in mean fast-food restaurant use frequency between 1999 and 2010 divided by the pooled SD of fast-food restaurant use frequency, which was 1.36.

<sup>c</sup>Mothers could choose more than 1 ethnic/racial category; those responses indicating multiple categories were coded as mixed/other. Because there were few participants who identified themselves as Hawaiians, Pacific Islanders, or Native Americans, these participants were also included in the mixed/other category.

differences in access to fast-food restaurants by neighborhood-level markers of SES and ethnic/racial composition, including previously published results from EAT 2010, which showed that White and Asian adolescents had fewer fast-food restaurants near their homes compared with their Hispanic, Native American, and Black counterparts.<sup>44,45</sup>

The analysis of NHANES data described previously and other studies have also examined differences among population subgroups and found evidence of disparities in fast-food consumption.<sup>3,46–49</sup> Socioeconomic differences were observed only among adults in the recent NHANES study, which similarly found that high school–educated adults were more likely to consume fast food compared with those who had not completed high school.<sup>3</sup> Trends among Asian and Native American populations were not examined in the NHANES data, but results of the study likewise indicated Black adolescents and adults were more likely to consume fast food compared with their White counterparts.<sup>3</sup> By contrast, the decreases observed in fast-food restaurant use among Hispanic families in the Minneapolis–St Paul metropolitan area were

not evident among Hispanic participants in NHANES.

Factors that might explain the observed local trend among Hispanic families include acculturation and secular shifts in the predominant types of fast food that were available and consumed. Although the Project EAT surveys did not specifically explore cultural influences on fast-food restaurant use, we noted a small shift in the proportion of Hispanic youths who were not born in the United States occurred in our study sample between 1999 and 2010 (from 35.6% to 39.4%). With regard to types of fast-food restaurants, it is notable that the survey item used to assess fast-food restaurant use for the current study provided examples of only traditional restaurants serving burgers and french fries (e.g., McDonald's), thus possibly excluding the capture of nontraditional fast food (e.g., sandwiches, burritos). However, a supplementary question that assessed use of different types of fast-food restaurants was included on the 2010 survey and cross-sectional analyses showed that use of traditional fast-food restaurants by Hispanic youths was similar to patterns of use among White, Asian, and Native American youths.<sup>44</sup> A more

detailed examination of cultural factors and shifts in the availability of different types of fast food in relation to the observed trends is deserving of future research.

### Study Strengths and Limitations

Strengths of this study included the unique design, large and diverse adolescent sample, and use of both parent and child reports. The repeated cross-sectional design allowed for the study of secular trends during an 11-year period in which much attention was given both to the nutritional consequences associated with frequent fast-food restaurant use as well as the health benefits associated with eating meals together with one's family. In addition, the ethnically/racially and socioeconomically diverse study population allowed comparisons of trends in different sociodemographic subgroups.

The combined assessment of changes in fast-food restaurant use patterns among parents and adolescents was another important contribution; however, the 1999 sample of paternal caregivers was too small for analysis and we could consider only maternal reports of their own consumption and purchasing of fast

**TABLE 4—Secular Trends in Purchasing Fast Food for Family Meals From 1999 to 2010 by Sociodemographic Characteristics: Minneapolis-St Paul, MN, Project EAT**

Characteristics	1999, No. <sup>a</sup>	2010, No.	Fast-Food Family Meals: Past Week Frequency				Frequent Fast-Food Family Meals (≥ 3 Times in Past Week)		
			1999, <sup>a</sup> Mean	2010, Mean	ES <sup>b</sup>	P	1999, <sup>a</sup> %	2010, %	P
Total sample	802	2228	1.08	0.98	-0.10	.02	9.5	7.2	.37
Ethnicity/race <sup>c</sup>									
White	247	660	1.14	0.94	-0.18	.01	9.2	6.1	.1
Black	232	630	1.02	1.17	0.14	.07	7.8	11.4	.12
Hispanic	115	371	1.49	1.00	-0.46	<.001	17.7	5.7	<.001
Asian	161	438	0.78	0.67	-0.11	.24	6.9	3.2	.05
Mixed/other	47	129	1.14	1.21	0.07	.66	8.8	10.2	.78
Highest household education									
Did not finish high school	167	510	0.86	0.89	0.02	.78	8.2	6.5	.43
Finished high school	181	485	1.24	1.04	-0.19	.03	11.0	6.8	.07
Some college	232	628	1.17	1.14	-0.02	.75	9.3	10.5	.6
Finished college	146	397	1.03	0.88	-0.14	.15	8.7	4.8	.08
Advanced degree	76	206	1.01	0.72	-0.27	.04	10.7	4.4	.05

Note. ES = effect size; Project EAT = Eating and Activity in Teens.

<sup>a</sup>The 1999 sample was weighted to allow for an examination of secular trends in purchasing fast food for family meals independent of demographic shifts in the population. For example, the test comparing purchasing of fast food for family meals within the group that did not finish high school between 1999 and 2010 is mutually controlled so that ethnicity/race makeup is the same in this group in the 1999 sample as in the 2010 sample.

<sup>b</sup>ES is calculated as the difference in mean frequency of purchasing fast food for family meals between 1999 and 2010 divided by the pooled SD of purchasing frequency, which was 1.08.

<sup>c</sup>Mothers could choose more than 1 ethnic/racial category; those responses indicating multiple categories were coded as mixed/other. Because there were few participants who identified themselves as Hawaiians, Pacific Islanders, or Native Americans, these participants were also included in the mixed/other category.

food for this study. Furthermore, information was not available at both time points to allow for investigation of disparities by household income or changes over time in the types of fast-food restaurants where foods and beverages were purchased, nutritional considerations in selecting menu options, eating food from full-service restaurants, or settings of consumption. Adolescents' own income from after-school or summer employment is another potential economic influence on fast-food trends that we could not explore as part of this study because of lack of survey data.<sup>27</sup> Caution should be used in making generalizations to youths and parents from other areas as the data were collected in 1 urban area.

### Implications for Future Research and Public Health Practice

Future studies should examine whether similar trends in fast-food purchasing and consumption continue over time in different populations and identify contextual factors of relevance to health promotion efforts. The disparities observed in the current study suggest that it will be particularly important to

identify cultural factors that are influencing trends in fast-food restaurant use and evaluate policy interventions (e.g., land use regulations to limit the concentration of fast-food restaurants) to ensure that they facilitate healthy food choices for all population groups.<sup>50,51</sup> It may additionally be informative to examine fast-food trends and influences relating to menu selections, consumption setting and time of day, and adolescent involvement in purchasing food for family meals. Finally, as the current study examined trends only among the maternal caregivers of adolescents, it will be of interest for future research to address fast-food consumption patterns among paternal caregivers. Information on trends among parents and other caregivers is of particular significance as interventions targeting their fast-food consumption may have a spillover benefit in terms of reducing fast-food purchases for family meals.

The results described here suggest that fast-food consumption did not increase despite continued growth in the availability of limited-service restaurants, and small decreases occurred among some population subgroups

over the past decade.<sup>42,43</sup> Modest changes in the frequency of fast-food consumption may have a large impact on the health of adolescents and their families at the population level; however, public health practitioners and policymakers must continue to build on existing efforts to support shifts in these eating behaviors as well as to reduce the portion sizes and energy density of menu items. The design of future public health interventions and messages addressing fast-food consumption will need to ensure cultural relevance and reach to all ethnic/racial populations, and particularly to Black and Native American subgroups. Community-based practitioners should assess the menu items available at local fast-food restaurants and alternative food sources so they can provide families with recommendations for obtaining healthful and culturally appropriate foods for family meals as well as advocate healthful changes in local food availability. ■

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## Contributors

N. Larson assisted with the acquisition of data and drafted the article. P. J. Hannan performed all data analysis and summarized the results. J. A. Fulkerson, M. N. Laska, and M. E. Eisenberg were involved in designing the overall study and survey development. D. Neumark-Sztainer conceptualized the overall study and served as principal investigator for each wave of the Project EAT (Eating and Activity in Teens) study. All authors contributed to data interpretation and critically reviewed the article.

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## Human Participant Participation

All study procedures were approved by the University of Minnesota's institutional review board. Informed consent or assent was collected for each participant as appropriate.

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