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Influencing healthful food choices in school and home environments: Results from the TEENS study

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Abstract

Background. The purpose of this research is to examine the effects of an intervention designed to increase the availability of fruits, vegetables and lower fat foods in homes and schools. This research is part of the TEENS study, a school-based intervention study.

Methods. Sixteen schools in Minnesota were recruited to be in the study, and approximately 3600 middle school students in the eight intervention schools were exposed to a multi-component intervention. The TEENS intervention included classroom-based curricula, family newsletters, and changes in the school food environment including increasing more healthful options on a la carte and on the school lunch line. In addition to student-level outcomes, changes in availability of fruits, vegetables, and lower fat snacks in home and school environments were evaluated. The TEENS study was conducted from 1997 to 2000.

Results. Parents of students in intervention schools reported making healthier choices when grocery shopping as compared to parents of students in control schools ($P = 0.01$). No intervention effects were evident from a home food inventory. Compared to control schools, intervention schools offered ($P = 0.04$) and sold ($P = 0.07$) a higher proportion of healthier foods on a la carte, but no effects were seen for fruit and vegetables sales as part of the regular meal pattern lunch.

Conclusion. Our results show mixed results for positively influencing adolescents' school and home environments.

Keywords: Middle school environment; School food environment; Intervention; Competitive foods; Parents; Adolescents

Background

American youth are falling short of achieving Healthy People 2010 goals for healthful dietary intakes (USDHHS, 2000, 1999; Krebs-Smith et al., 1996; Munoz et al., 1997; Cavadini et al., 2000). In recent years, we have begun to consider eating patterns using a social–ecological framework, recognizing that the social and physical environments of families, schools, and communities all have important roles to play in what youth choose to eat (Sallis and Owen, 2002; Story et al., 2002a; Kubik et al., 2005; Wardle et al., 2005; Bogden and Vega-Matos, 2000; CDC, 1996).

Effective environmental change strategies have been emphasized as key in improving the eating behaviors and dietary intakes of youth (Stettler, 2002; Booth et al., 2001; IOM, 2005). However, there have been few studies with published results reporting on environmental-level efforts (French et al., 2004; Perry et al., 2004; French, 2003; Sallis et al., 2003). Teens Eating for Energy and Nutrition at School (TEENS) was a randomized school-based intervention trial conducted in middle schools with a goal of developing and

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evaluating school and family-linked intervention strategies to promote students' consumption of fruit, vegetable, and lower fat snacks (FVLFS); these results are presented elsewhere (Lytle et al., 2004). Environmental outcomes were evaluated as secondary outcomes of the study. The purpose of this paper is to describe the results of the TEENS intervention on school and family-level nutrition environments including the effectiveness of the intervention to positively influence the (1) availability of FVLFS in families' homes; (2) snack food selections made by families at the grocery store; (3) fruit, vegetable, and salad sales occurring in school cafeterias; and (4) the proportion of lower fat and healthier items offered and sold in a la carte lines.

Methods

Study design

Data for the present analyses are from school and parental data obtained from TEENS. TEENS was conducted in 16 schools in Minneapolis/St. Paul, Minnesota, and targeted schools with a lower income population (Lytle and Perry, 2001; Birnbaum et al., 2002). After meeting recruitment criteria, schools were randomly assigned from within matched pairs to intervention or control (delayed intervention) conditions. The study was reviewed and approved by the University of Minnesota Institutional Review Board for the protection of human subjects. Baseline data were collected in Fall 1998; a 2-year school-based intervention followed. Follow-up data on the cohort of students, the school, and families were obtained in Spring 2000. The students represented in TEENS were primarily white (72.9%), and 19.8% were categorized as lower socioeconomic status based on qualifying for free and reduced lunch and parental education and occupation (Lytle et al., 2004).

TEENS intervention

The TEENS intervention included classroom, family, school policy, and food service components (Lytle and Perry, 2001; Birnbaum et al., 2002; Story et al., 2002b). A brief description of the family and school-level components follow as the effectiveness of these elements are examined in this manuscript.

Families of students enrolled in the TEENS class received three newsletters and sets of behavioral coupons with each newsletter for each year of the intervention (Lytle and Perry, 2001). The newsletters included a short lead article, tip sheets for eating more FVLFS, and sets of behavioral coupons. These coupons had simple, specific messages such as, "Buy pretzels instead of potato chips the next time you shop". Families received gift certificates for completing and mailing in coupons.

The school-level environmental strategies involved School Nutrition Advisory Councils (SNACs) and working with school food service. SNACs were established to convene school and parental stakeholders to discuss and propose school-level policy to improve the school food environment (Kubik et al., 2001). The composition of SNACS differed slightly school-to-school but included, as a minimum, a school administrator, food service staff, teacher, student, and university staff member.

The emphasis of the school food service intervention was on increasing the offerings and sales of FVLFS in the lunchroom and on the a la carte lines. District food service directors and workers from intervention schools attended trainings that emphasized the importance of offering more FVLFS, gave them new tools for promoting FVLFS, exposed food service workers to snacks and beverages that could be offered on the a la carte line that met the TEENS fat criteria of less than 5 g of fat per serving, including taste testing of lower fat products, and offered a forum for sharing ideas between schools. TEENS interventionists also conducted on-site trainings to help workers problem-solve.

Measures

Parent survey

Due to financial constraints, we conducted a post-only survey on a randomly chosen subsample of parents. In total, 526 families received, via mail, the TEENS parent survey in the spring of the 8th grade intervention year.

The parent survey included a 43-item home shelf inventory (Crockett et al., 1992) that asked the respondent parent to indicate if they had specific food items in their home at the time that they completed the survey. The parent survey also included nine paired responses, asking "If you had to choose between the following paired items in the grocery store, which would you buy?" The pairs were based on the TEENS behavioral coupons used in the family intervention component that gave suggestions for substituting lower fat choices for higher fat choices when shopping.

School food environment/fruits, vegetables, and salads

Data on the fruits, vegetables, and salads available on school cafeteria lunch lines were collected at eight time points: baseline (fall 1998), six interim time points; and at follow-up (spring 2000). Each data point included 5 consecutive days of meal information. Data collected included the total number of students served the meal pattern lunch, the types and amounts of fruit and vegetable choices offered and sold, and the number of vegetable salads sold. With a few exceptions, these data were abstracted from schools' food production records. Periodic observations of school meals were conducted to confirm production records.

School food environment/a la carte

For the purpose of TEENS, we defined a la carte as any foods or beverages that were available in the cafeteria and not offered as part of the meal pattern lunch. Guided by earlier work conducted on a la carte in schools (Harnack et al., 2000) and our intervention goals, we developed a daily data collection form for a la carte items that categorized a la carte items and documented the number of items offered and sold in each category.

At baseline and follow-up, TEENS evaluation staff observed and recorded all the foods and beverages that were offered and sold on a la carte lines for a 5-day period. Two evaluation staff conducted independent reviews of the data categorization and abstraction for data quality assurance. We summarized data into categories of "Foods to Promote" and "Foods to Limit". "Foods to Promote" included snacks that were 5 or less g of fat, 100% fruit juice, water and low fat milk, fruits or vegetables offered, and other lower fat versions of popular entrees such as pizza or pretzels and cheese. "Foods to Limit" included all snacks that were more than 5 g of fat, fruit drinks, and higher fat popular entrees such as regular pizza or nachos.

Table 1
The effect of the TEENS intervention on the home food environment

Home shelf inventory	Mean number of items reported in the house at the time of the post treatment survey		Difference by condition/ *P* value *
	Intervention	Control	
High fat items (range = 0–15)	9.08	9.00	Difference = 0.08 *P* = 0.39
Fruits (range = 0–14)	6.84	6.50	Difference = 0.34 *P* = 0.16
Vegetables (range = 0–14)	9.41	9.24	Difference = 0.17 *P* = 0.32
Shopping pairs	**Mean number of lower fat choices from shopping pairs**		
	Intervention	Control	
Lower fat option favored in pair (range = 0–9)	4.73	4.26	Difference = 0.47 *P* = 0.01

TEENS Study, Minneapolis, Minnesota, 1997–2000 (n = 343).
* P values based on a one-tailed test of significance.