

Promoting Healthy Weight Among Elementary School Children via a Health Report Card Approach

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Background: As overweight continues to rise among children, schools seek effective and sensitive ways to engage parents in promoting healthy weight.

Objective: To evaluate a school-based health report card on the family awareness of and concern about the child weight status, plans for weight control, and preventive behaviors.

Design: Quasi-experimental field trial with a personalized weight and fitness health report card intervention (PI), a general-information intervention (GI), and a control group (CG). Outcomes were assessed using a post-intervention telephone survey, including process and outcome measures.

Participants: The intervention included 1396 ethnically diverse students at 4 elementary schools in an urban area. Telephone surveys were completed by 399 families from an evaluation sample of 793.

Intervention: Families were randomly assigned to the PI, GI, or CG and mailed intervention materials. The CG was mailed GI materials after the survey.

Main Outcome Measures: Parent awareness of child weight status, concerns, weight-control plans, and preventive behaviors. Group effects were significantly different by the child's weight status, so results were stratified.

Results: Among overweight students, intervention parents were more likely to know their child's weight status (PI, 44%; GI, 41%; CG, 23%) ($P=.02$). The PI parents planned medical help (PI, 25%; GI, 7%; CG, 9%) ($P=.004$), dieting activities (PI, 19%; GI and CG, <5 cases) ($P=.02$) and physical activities (PI, 42%; GI, 27%; CG, 13%) ($P<.001$) for their overweight children. No group effect on concern or preventive behaviors was detected. Most parents of overweight children who read materials requested annual weight and health information on their child (PI, 91%; GI, 67%).

Conclusions: Among overweight children, the PI was associated with increased parental awareness of their child's weight status. Although parents wanted PI for their children, more research is needed to test this approach on children's self-esteem and plans for weight control.

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THE PREVALENCE of childhood overweight, measured by body mass index (BMI; calculated as weight in kilograms divided by the square of height in meters) at or above the 95th percentile for children, adolescents, and young adults of the same age and sex has increased dramatically, from 4% among those aged 6 to 11 years and 5% among those aged 12 to 19 years in 1963 to 1966 to 15% in 1999 to 2000.^{1,2} The medical consequences of overweight in childhood and adolescence include hyperlipidemia, hypertension, and an increased risk for development of type 2 diabetes mellitus, orthopedic disorders, and respiratory illnesses.³⁻⁵ Overweight children may also experience adverse psychosocial consequences, including discrimi-

nation and low self-esteem, and may become isolated and stigmatized.^{4,6,7} School-aged children are in a critical period for the development of overweight because of the relationship of childhood to adulthood overweight status.^{3,4}

Surveillance data for BMI can serve to assess nutritional status of populations, monitor changes over time, promote epidemiological research, screen and refer individuals at risk, and develop and evaluate programs and policies.^{8,9} An expert committee recommended routine preventive screening for overweight children, with further evaluation for those at the upper end of the BMI percentiles.¹⁰ School systems are collecting data or contemplating their collection for surveillance, although debate is ongoing at local and state levels on the role of schools in

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screening children for overweight.^{11,12} Some schools are sending screening information to families via letters or reports in an effort to inform and motivate parents regarding their children's weight issues.¹² Parental involvement in obesity interventions is considered integral to creating an environment that promotes protective eating and physical activity behavior in children.^{13,14} Sharing individualized weight status information may be an important way to raise family awareness of children's weight status and health risk.

A coalition of educators, school nurses, community health researchers, and clinical providers in Cambridge, Mass, are developing and testing a school-based healthy weight program among public elementary students (grades K-8) consisting of BMI surveillance, health report card feedback, and school nurse follow-up. A physical education department surveillance system has been in place for several years. Physical education teachers collect height, weight, and fitness data annually on all elementary students during physical education class. The prevalence of overweight increased from 1999 through 2001. Based on Centers for Disease Control and Prevention (CDC) reference,¹⁵ 34.9% among 4207 children aged 5 to 14 years in 2001 were at risk for overweight (17.6%) (BMI from the 85th to 95th percentile) or were overweight (17.3%) (BMI \geq 95th percentile), compared with 17.7% at risk and 16.3% overweight in 1999 (Health, Physical Education, and Athletics Department, Cambridge Public Schools, unpublished data, September 2002).

In spring of 2001, the Institute for Community Health in collaboration with the Cambridge Public Schools planned to evaluate sharing routine school-based BMI surveillance data with families. First, could surveillance data be used to inform and motivate families to incorporate activities consistent with promoting healthy weight? Second, could an evaluation help school districts and health care professionals better understand the risks and benefits associated with using a health report card approach? We hypothesized that a personal information intervention (PI) using a health report card would increase parental awareness of child weight status compared with a minimal, general-information intervention (GI) and a control group (CG). Although the intervention was short term and of low intensity, we hypothesized that it may also increase plans for weight control or preventive behaviors. In addition, we tested the feasibility of the health report card approach and any possible negative impact on labeling the child's overweight status and sharing this information.

Although not unique to our community, a health report card used to share BMI information with families and encourage promising lifestyle-oriented dietary and physical strategies grew out of our community-based recommendations for action. We focused on the role of the child's parent(s) in influencing various intermediate variables that may ultimately influence long-term outcomes of interest, ie, preventing or reducing childhood overweight. Parents' knowledge and concerns regarding overweight may influence their own behavior, and specific (hypothesized) protective behaviors such as limiting television to 2 hours, encouraging at least 1 hour of physical activity, and serving at least 5 fruits and vegetables daily may affect their children's behaviors directly and indirectly.

Cambridge is an ethnically, racially, and linguistically diverse city of more than 101 000 people, including 13 450 children and adolescents 17 years and younger in 2000.¹⁶ At least 65 countries are represented in the city; Spanish, Portuguese, and Haitian Creole are the predominant non-English languages spoken by public school children and their families. In the 2000-2001 school year, 5172 students in kindergarten through eighth grade were enrolled in 15 public elementary schools. Of these students, 40% were white; 34%, African American or other black; 14%, Hispanic; 11%, Asian; and 48%, eligible for reduced-price or free lunch.¹⁷

We tested our hypotheses with a quasi-experimental field trial with 2 intervention groups (PI and GI) and the CG at 4 public schools in the spring and summer of 2001. The internal review board at the Cambridge Health Alliance approved the study in June 2001.

FORMATIVE RESEARCH

Focus groups with parents, faculty, and administrators from the intervention schools (n=40) and a community advisory group of health providers, human services, educators, public health professionals, and child advocates (n=25) were used to test intervention components. Participants were supportive of the concept that child information collected by the schools should be shared with families and might be useful; but participants requested that we test the utility of providing general information only, attempt to provide information respectful of family culture and individual self-esteem, and have follow-up available for families. As a result of this input, the GI group was added to the study design, materials were reviewed for cultural competency and positive messages, and school nurses were asked to follow up with children at highest risk (BMI >95th percentile).

INTERVENTION DESIGN AND SAMPLE

Four predominantly English- or Spanish-speaking elementary schools agreed to participate in the intervention. From a total enrollment of 1574, 1396 students with valid height and weight measurements were included in the intervention sample. We randomized 1131 families, compiled from students with the same parent name and address, into the 3 groups. The PI (n=481) and GI groups (n=451) were mailed intervention materials in June 2001. We sent materials at school year completion to reduce confusion and potential contamination among families receiving different packages. The GI materials were mailed to the CG (n=464) after telephone interviews were completed.

EVALUATION

We surveyed an evaluation sample of 793 families via telephone (276 PI families, 265 GI families, and 252 CG families) that consisted of all overweight index children plus a random sample of children of other weight status from each of the groups on the basis of an anticipated response rate of 80%.

TELEPHONE INTERVIEWS

Starting 1 week after intervention materials were sent, trained interviewers called PI and GI families for 6 weeks. Families were asked about only 1 child, prioritizing overweight children. Interviewers made repeated attempts to reach families by calling at different times, days, and weeks. After sending Spanish PI and GI materials, calls in Spanish were conducted for 4 weeks. The

CG families were called for 4 weeks in August. Data were entered into an ASCII database (American National Standards Institute, Washington, DC) by a professional data entry service.

INTERVENTION COMPONENTS

Materials developed in English were translated into Spanish. A notification letter was sent home with students with an opt-out option before the intervention. For the PI and GI groups, the package of intervention materials included an introductory letter and a 1-page general-information sheet with tips for healthy living, including our slogan "2-1-5," developed to promote the following daily recommendations: 2 hours or less of television or videos,¹⁸ 1 hour of physical activity,¹⁹ and 5 servings of fruits and vegetables.²⁰ Other tips and resources for healthy living and managing overweight were based on existing materials,^{21,22} including a return-addressed stamped postcard of suggestions for community- or school-based obesity-prevention approaches for families to check off and return, and a directory of physical activity options available to families in Cambridge.

The PI group also received the personalized health report card of their children's height, weight, and weight status (overweight, at risk for overweight, healthy weight, and underweight), fitness test results, and interpretive information. The materials referred parents with children outside the healthy weight range to follow up with their primary health care provider or their school nurse.

IMPLEMENTATION/FEASIBILITY MEASURES

The extent to which the intervention was implemented was measured as the proportion of PI or GI families who reported receiving the intervention materials. The extent to which the target audience was engaged by the intervention was measured by the percentage of families who reported reading the information, discussing it with their child, and asking for the information annually.

BMI SURVEILLANCE

Surveillance data were used to personalize the health report card and to stratify the results by the weight status of the child. In April 2001, new stadiometers and scales were installed at each school. Physical education teachers were trained to collect, record, and enter height, weight, and physical fitness data. Physical education teachers, assisted by local graduate students, entered the information into an Excel database (Microsoft Corp, Redmond, Wash). On the basis of measured height and weight, BMI was calculated and BMI percentiles were compared with the sex- and age-specific 2000 CDC/National Center for Health Statistics reference standards.¹⁵ The data were cleaned and merged with school department family demographic information such as date of birth, ethnicity, language spoken at home, and participation in free and reduced-price lunch programs.

INTERMEDIATE OUTCOME MEASURES

The measures assess the efficacy of the intervention materials. First, awareness of the parent or the caregiver was measured as the respondent's correct classification of their child's actual weight status as overweight, at risk for overweight, healthy weight, or underweight. Second, the respondent's concern about their child's weight was measured from the response categories of very, somewhat, slightly, and not at all concerned (for reporting, we collapsed very concerned [$n=51$] and somewhat concerned [$n=63$] together). Third, the planning of weight-control activities was measured with a series of responses to the following 10 questions about parent plans (or action) in 30 days since receiving intervention materials to initiate ef-

forts to control weight: (1) see a pediatrician or primary health care provider; (2) see a school nurse; (3) see a weight specialist or nutritionist; (4) go to a weight-loss clinic; (5) put child on a diet; (6) skip meals or snacks; (7) give diet pills or herbal supplements; (8) increase exercise or physical activity; (9) sign up for sport or exercise class; and (10) other. We collapsed 9 items into the categories of medical services (items 1-4), diet-related activities (items 5-7), and physical activities (items 8 and 9). A response to each item within a category was counted only once; thus, 1 or more responses in each category was defined as a positive response to the corresponding intention. Finally, we measured preventive behaviors as the respondent's report on specific recommended 2-1-5 behaviors.

SAFETY/DISCOMFORT MEASURES

We assessed safety and comfort in 3 ways. First, discomfort was measured by the respondent's report that, after discussion, their child was very, somewhat, or slightly uncomfortable with the information or the materials. Second, our intervention materials stated that children's dieting activities should be under medical supervision. If families who received intervention disproportionately initiated dieting without medical counsel, we interpreted this as a possible safety issue associated with the intervention. Third, a disproportionately higher level of concern among the PI relative to the GI and/or the CG respondents was interpreted as a possible safety issue.

SURVEY DEVELOPMENT

The telephone survey used, where possible, validated questions from the Harvard School of Public Health Food and Activity Survey,²³ and the CDC Youth Risk Behavioral Survey.²⁴ We piloted the questionnaire with 35 English- and Spanish-speaking families and revised it as necessary.

DATA ANALYSIS

The baseline comparability among the PI, GI, and CG groups was tested on demographic and anthropometric variables by using the χ^2 test. Because the evaluation sample included all overweight children, more than 50% of the children were overweight (39%) or at risk for overweight (12%). To simplify presentation and maximize sample size, in our analysis, overweight is defined as a BMI at or above the 85th percentile, and healthy weight as a BMI ranging from the 5th to the 84.9th percentiles. All analyses are stratified by the child's overweight or healthy weight status, because weight status was independently associated with implementation and outcome measures (effect modification). Only the PI and GI groups were compared for process measures differences using the χ^2 and Fisher exact tests for small cell sizes. We assessed the intervention effect using the χ^2 and Cochran Mantel-Haenszel tests to compare differences in outcome variables among the study groups. To determine what factors independently predict the parent's awareness of their child's weight status, we fitted multivariate logistic regression models for overweight and healthy children. The outcome variable was a binary response of the correct or incorrect awareness of weight status. The covariates of interest were age, sex, race/ethnicity, lunch program status, and study group. All interaction terms between study group and covariates of interest were evaluated but not included in the final model because they were not statistically significant.

RESULTS

Telephone interviews were completed with 399 families, a 50% response rate including 45% of PI families,

Table 1. Characteristics of Study Group*

Characteristic	% of Group		
	PI (n = 124)	GI (n = 138)	CG (n = 137)
Child characteristics			
Male	53.2	50.0	46.7
Age, y			
5-7	33.1	26.8	27.0
8-10	25.8	31.9	33.6
11-14	41.1	41.3	39.4
Race			
White	43.6	50.0	40.2
African American	28.2	23.9	26.3
Hispanics	24.2	15.9	27.0
Others	4.0	10.2	6.6
BMI status			
Underweight	0.8	0	0.7
Healthy weight	53.2	46.4	47.5
At risk for overweight	8.9	13.8	13.1
Overweight	37.1	39.9	38.7
Free and reduced lunch program	38.8	35.5	43.1
Parent characteristics			
Language spoken at home			
English	79.0	77.5	73.7
Spanish	13.7	13.8	19.0
Other	7.3	8.7	7.3
Mother's education†			
Less than high school	6.6	6.4	17.2
High school graduate	19.8	21.4	26.3
Some college	17.0	12.7	9.1
College graduate	22.6	34.9	27.3
Beyond college	34.0	24.6	20.2

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by the square of height in meters); CG, control group; GI, general-information intervention; PI, personalized weight and fitness health report card intervention.

*Percentages have been rounded and may not total 100.

†Differences were significant at $P = .02$.

52% of GI families, and 54% of CG families. Of the non-responding households, 187 (24%) did not answer the telephone after 10 tries or did not return a voice message on their answering machine; 150 (19%) had disconnected or incorrect telephone numbers; 40 (5%) had other issues that included language incompatibilities; and 17 (2%) refused to participate. Among the completed interviews, 15.5% were with Spanish-speaking families. Children in nonresponding households were significantly older (mean age, 9.9 vs 9.5 years), more often racial minorities (55% of African American, 54% of Hispanic, 62% of Asian, and 40% of white families did not participate), and significantly more likely to be eligible for the free and reduced-price school meal program.

The evaluation sample characteristics are shown in **Table 1**. The 3 groups were similar for sex, race, BMI status, lunch program eligibility, and language. The CG mothers had significantly lower levels of educational attainment than the PI or the GI mothers ($P = .02$).

Implementation results are stratified by weight status of the child and reported in **Table 2**. Mothers constituted 74.7% of the respondents; fathers, 20.8%; and others, 4.5%. About half of the respondents acknowledged receiving the intervention materials, including sig-

nificantly more PI than GI respondents ($P < .01$). There were no sex differences among those acknowledging the materials. For those who received the intervention, most respondents read at least some of the materials, and among healthy-weight children, PI materials were significantly more likely to have been read than GI materials ($P = .02$). Among the PI families, 91% of those with an overweight child who read the materials wanted the information annually. Although the difference was not significant, respondents with an overweight child were somewhat more likely to have discussed the materials with their child (PI, 63%; GI, 48%) compared with respondents with a healthy-weight child (PI, 37%; GI, 31%).

Intermediate outcome results are reported in **Table 3**. There were statistically significant group effects on parent awareness and planning of weight-control activities.

AWARENESS

The PI (44%) and GI respondents (41%) were significantly more likely to correctly identify their children's weight status than CG respondents (23%) ($P = .02$). Although the concordance between the parent's awareness and the child's actual weight status among healthy-weight children was higher (PI, 89%; GI, 88%; CG, 91%) than among families with overweight children, there were no significant intervention effects. Among families with overweight children, the PI vs CG group effect on the respondents' awareness of weight status was significant in a multivariable logistic regression model controlling for possible demographic predictors (odds ratio [OR], 3.08; 95% confidence interval [CI], 1.35-7.01), as was the GI vs CG group effect (OR, 2.61; 95% CI, 1.19-5.75) (**Table 4**). In addition to group status, significant factors included older age. Among healthy-weight children, there were no significant predictors of the parent's awareness of the child's weight status.

CONCERN

Group effects of the PI and GI intervention on concern of the respondents regarding their child's weight approached significance ($P = .055$), but without clear directionality; 48% of PI, 53% of GI, and 33% of CG families of overweight children reported being very or somewhat concerned about their child's weight. Although respondents with overweight children were more likely to be concerned, only 9% of PI and GI families of healthy-weight children reported being very or somewhat concerned about their child's weight, vs 21% of CG families.

PLANNING WEIGHT-CONTROL ACTIVITIES

After receiving the intervention materials, PI respondents were more likely to report initiating or intending to initiate clinical services, dieting, or physical activity compared with the GI or the CG respondents. Respondents' awareness of their child's weight status was not significantly related to their intention to initiate activities to control weight; however, the respondents with a

Table 2. Implementation Measures by Child's Weight Status*

Variable	Overweight, † No. (%) of Groups (n = 131)			Healthy Weight, No. (%) of Groups (n = 129)		
	PI	GI	P Value‡	PI	GI	P Value‡
Received information						
Yes	36 (63)	25 (34)	.004	49 (74)	22 (35)	<.001
No	13 (23)	33 (45)		13 (20)	28 (44)	
Do not know	8 (14)	16 (22)		‡	13 (21)	
Among those who received information, read any	32 (89)	21 (84)	.58	46 (94)	16 (73)	.01
Among those who read information§						
Want child's weight and fitness information annually	29 (91)	14 (67)	.40	33 (72)	11 (69)	.82
Discussed information with child	20 (63)	10 (48)	.37	17 (37)	5 (31)	.68
Among those who discussed information with child, made child uncomfortable	12 (60)	¶	.003#	7 (41)	¶	.047#

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by square of height in meters); GI, general information intervention;

PI, personalized weight and fitness health report card intervention.

*Denominators vary because of missing values for specific questions.

†Defined as children with a BMI at or above the 85th percentile.

‡Determined for group difference.

§Includes all, most, and some.

||Includes very, somewhat, and a little.

¶Includes fewer than 5 cases.

#The Fisher exact test was used because there were fewer than 5 cases.

Table 3. Parent's Awareness, Concern, Plans, and Behaviors by Child's Weight Status*

Variable	Overweight, † No. (%) of Group (n = 202)				Healthy Weight, No. (%) of Group (n = 195)			
	PI	GI	CG	P Value‡	PI	GI	CG	P Value‡
Awareness of child's weight status	25 (44)	30 (41)	16 (23)	.02	58 (89)	56 (88)	57 (91)	.86
Concern of parents about child's weight§	27 (48)	39 (53)	23 (33)	.0549	6 (9)	6 (9)	13 (20)	.10
Weight-controlling plan								
Seek medical service	14 (25)	5 (7)	6 (8)	.004	5 (8)			.004¶
Diet-related activities	11 (19)			.02				
Physical activity-related activities	24 (42)	20 (27)	9 (13)	<.001	13 (20)	9 (14)		.002
Preventive behaviors								
Set 2-h television limit	21 (41)	29 (47)	18 (32)	.27	26 (45)	26 (48)	22 (60)	.37
Get 1 h of physical activity	45 (85)	64 (91)	50 (83)	.35	60 (95)	53 (87)	40 (95)	.15
Serve 5 servings of fruits and vegetables per day	5 (9)	8 (12)	8 (12)	.90	15 (25)	14 (23)	11 (18)	.64

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by square of height in meters); CG, control group; GI, general-information intervention; PI, personalized weight and fitness health report card intervention.

*Denominators vary because of missing values for specific questions.

†Defined as children with a BMI at or above the 85th percentile.

‡Determined for group difference.

§Includes very and somewhat concerned.

||Includes fewer than 5 cases.

¶The Fisher exact test was used because there were fewer than 5 cases.

higher level of concern about their children's weight were more likely to report initiating or planning to initiate weight-related activities (analysis not shown).

PREVENTIVE BEHAVIORS

We did not detect any significant intervention group effects on 2-1-5 behaviors.

Safety/discomfort results are reported in Tables 2 and 3. Of the 52 respondents who reported discussing materials sent home with their child (Table 2), significantly more PI than GI parents reported the child's discomfort. Overweight children were somewhat although not significantly more likely to report being uncomfort-

able with the information (60%) than were healthy-weight children (41%). As noted, there were marginal group effects on the concern variable ($P = .055$), although more GI families reported concern than did PI families (Table 3). For unsupervised dieting, overall, 7 (40%) of the 19 families planning to initiate dieting activities reported not planning to seek medical counsel (results not shown).

COMMENT

This pilot study is, to our knowledge, the first to evaluate risks and benefits associated with using a health report card approach to inform families about the results

Table 4. Parent's Awareness of Child's Weight Status

	OR (95% CI)			
	Overweight Children* (n = 199)		Healthy Weight Children (n = 191)	
	Bivariate Logistic Regression Model	Multivariate Logistic Regression Model†	Bivariate Logistic Regression Model	Multivariate Logistic Regression Model†
Age	1.28 (1.13-1.44)	1.29 (1.14-1.47)	1.01 (0.85-1.19)	1.00 (0.85-1.19)
Sex, female vs male	1.60 (0.89-2.87)	1.64 (0.86-3.13)	0.49 (0.19-1.29)	0.49 (0.19-1.29)
Race				
African American vs white	0.80 (0.40-1.60)	0.96 (0.43-2.15)	1.03 (0.31-3.45)	1.03 (0.27-3.92)
Hispanic vs white	0.78 (0.38-1.61)	0.83 (0.33-2.05)	1.21 (0.31-3.45)	1.23 (0.26-5.83)
Other vs white	0.22 (0.03-1.86)	0.30 (0.03-2.90)	0.65 (0.16-2.57)	0.74 (0.18-3.03)
Lunch program, free vs not free	0.78 (0.43-1.39)	0.82 (0.39-1.71)	1.12 (0.41-3.05)	1.08 (0.32-3.64)
Group				
PI vs CG	2.64 (1.23-5.67)	3.08 (1.35-7.01)	0.87 (0.28-2.76)	0.86 (0.27-2.76)
GI vs CG	2.30 (1.11-4.75)	2.61 (1.19-5.75)	0.74 (0.24-2.26)	0.75 (0.24-2.37)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by square of height in meters); CG, control group; CI, confidence interval; GI, general-information intervention; OR, odds ratio; PI, personalized weight and fitness health report card intervention.

*Defined as children with a BMI at or above the 85th percentile.

†Included age, sex, race, lunch program, and group.

of routine BMI screening in schools. Overall, group effects on implementation and intermediary outcome measures differed on the basis of child's weight status. Compared with the CG, results indicate that among overweight children (including those at risk for overweight), the PI was associated with greater parental awareness of the child's weight status and parental intention to initiate weight-controlling related activities, and no significant association with the 2-1-5 behaviors.

Although many families did not acknowledge receiving intervention materials, those who did were much more likely to remember the personalized materials, and most wanted the information annually. The GI respondents also asked for annual information, indicating that general information along with BMI status is desirable and acceptable to most families. Implementation results highlight the difficulty of getting information to a target group, much less engaging people around the information. Respondents indicated change of address, multiple household members accessing mail, and not recognizing materials as school related as reasons for not receiving or acknowledging the intervention materials.

As in previous studies, we found overall a low awareness among parents with overweight children as to the child's actual weight status.^{25,26} Of all parents of overweight children, 43% reported their child was a healthy weight. The parent's ability to correctly classify their child's weight status was enhanced if the child was of healthy weight and was older. Explanations might include that the CDC-named categories used to classify child weight status may have been confusing to parents, or that as overweight becomes the norm among our youth, it is less likely to be recognized as problematic and more likely to be labeled healthy weight. Parents of young children were particularly unwilling to label their children as overweight, perhaps reflecting the more transient nature of overweight in younger children. Conversely, parents of older overweight children were more likely to acknowledge their

children's condition, consistent with their longer experience with a more intractable situation. The CG parents were the least likely to identify their overweight children correctly, suggesting that the information sent, whether community-level statistics on overweight or personal-level weight status, may play an important role in raising awareness about child overweight status. The health report card, as we constructed it, apparently had a modest impact on informing parents of overweight children, and with further refinement may be a valuable tool for schools to educate families about their children's weight status. Efforts to develop consistent health messages that use the same measurements for recognizing, controlling, and preventing overweight are critical if parents are to understand the implications for their children. In addition, the differential impact of messages on families, depending on the age and weight status of their children, need to be taken into consideration.

In our study, about half of the families of overweight children were somewhat or very concerned about their child's weight status, although there were no clear intervention effects. Concerned parents were more likely to plan weight-control strategies than less concerned families, but were not more likely to engage in preventive 2-1-5 strategies. The overarching question of how to raise awareness of health risk and motivate appropriate action without raising undue fear and concern is extremely important for any school district undertaking the health report card strategy. Policy makers are beginning to address these concerns through position papers that stress sensitive data collection, appropriate interpretive information, and clinical follow-up.^{11,27} Almost 20% of the families reported planning diet-related activities with their overweight child. Regardless of the amount of antidiets information included in our materials, it still seems to be a typical response for parents to try to control their children's weight through dieting.²⁸ Since this is contraindicated by most experts in the pediatric over-

What This Study Adds

As overweight increases among children, schools are seeking effective and sensitive ways to inform parents of their children's weight status and to motivate families to embrace behaviors that promote healthy weight. Many schools collect height and weight data annually and wish to share this information with families. What are the risks and benefits of this approach? In our study, although no change in behavior was found, parents who received a health report card with information on their child's BMI category were more aware of their child's weight status than those who did not receive any information. Parents wanted the personalized weight information; however, more research is needed to understand how this approach may affect overweight children's self-esteem and parents' intentions to initiate weight-control actions.

weight field,^{29,30} it highlights the need for further education for parents on how to appropriately curb and prevent weight gain in their children.

The intervention materials did not appear to improve the respondents' preventive 2-1-5 lifestyle behaviors, suggesting that the materials were not sufficiently motivational or the venue of a brief 1-time mailing is not sufficient to have an impact on action on these behavioral guidelines. We may have more success in affecting behavioral change with repeated annual mailings and more targeted messages that acknowledge the family's stage of change and the weight status and age of the children. Appropriate follow-up for at-risk families will probably enhance family-level behavior change.

Collecting and entering accurate height and weight data, calculating BMI percentile categories, and sending individualized information home is a major undertaking for many school systems. However, as shown in this study, surveillance data on school-aged students may be useful to fill current gaps in information necessary for planning programs and policies and improving parental awareness, particularly among families with overweight children. Although physical education departments would like to enhance the usefulness of fitness and weight assessment for parents and children, questions remain about the content and manner in which such potentially loaded information is delivered and how to connect awareness to actions that prevent obesity or maintain healthy weight.

This intervention study had several limitations. Minorities and lower socioeconomic groups were significantly underrepresented in the telephone survey evaluation sample. Race, language, and free-lunch eligibility were significant predictors of the parent's awareness of the child's weight status in bivariate analysis, but not in a multivariate model.

Our response rate was lower than expected. This may be due in part to the time of year in which the study was conducted. Summer months represent a time when many families are unavailable, and thus those who did participate may represent a biased sample. Because of the small size of the study group, we were unable to examine the interaction effects by further breakdown of demographic characteristics and 4 categories of weight sta-

tus. Results, particularly regarding weight-control plans, are based on small sample sizes and should be interpreted as suggestive only.

There was potential for measurement error in the assessment of overweight and the other variables. This study took advantage of a real-world circumstance in which lay data collectors were already collecting and recording height, weight, and fitness data for other purposes. Although trained on standardized techniques, the physical education teachers' ability to collect and record data could introduce variability into the data collection. The use of BMI percentiles as our exclusive measure of overweight could introduce inherent associated limitations.^{31,32} In addition, the outcome measures of setting current television limits and offering fruits and vegetables were based on the parent's or the caregiver's self-report of their behavior, and the measure of physical activity was the respondent's perception of the child's level of physical activity.

CONCLUSIONS

Among overweight children, the health report card was associated with increased parental awareness of their child's weight status. This study demonstrates that a health report card approach may be an important tool for schools interested in informing and motivating parents about their overweight children. Although most parents wanted personalized information on their children, more research is needed to ascertain the impact of this approach on children's discomfort, self-esteem, and plans to initiate weight-controlling activities.

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