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Long-Term Obesity Prevention and the Motivating Adolescents with Technology to CHOOSE Health™ Program

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Abstract

Background: The Motivating Adolescents with Technology to CHOOSE Health™ (MATCH) intervention integrates lifestyle behavior change curriculum within academic subjects taught in seventh grade. This study assesses obesity prevention in participants into high school.

Methods: The study compares four- to five-year longitudinal data from a single-site cohort ($N = 106$, 54% retained from 195 participants at baseline; 82% of those still at the school) pre- and postintervention in a rural middle school with high obesity rates with data from the 2006 Child Survey and 2010 Child and Young Adult Surveys from the National Longitudinal Survey of Youth 1979 ($N = 600$), which serves as a nationally representative comparison group. Outcome measures include pre- and postchanges in weight category, BMI, BMI z-score, BMI percentile for age and gender, and rates of change per month in BMI measures.

Results: At follow-up, change in percent overweight was significantly different between groups, with the MATCH group decreasing (20–12%) and the comparison group increasing (17–19%). Overall, the MATCH group had significantly higher decrease rates in BMI z-scores ($p = 0.002$) and BMI percentile ($p = 0.01$) than the comparison group. Of all adolescents at healthy weight at baseline, 2% from MATCH became overweight after five years, whereas 13% of the comparison group increased to overweight or obese ($p = 0.02$) after four years.

Conclusions: Despite a small sample size and a high-risk setting, at long-term follow-up, a greater proportion of MATCH participants than in the comparison group decreased from overweight to healthy weight or remained at healthy weight. The MATCH results suggest that some proportion of high-risk adolescents can have their growth trajectory follow a healthier path than expected.

Introduction

Childhood obesity is a public health epidemic. In the United States, recent data reveal that 16.9% of children ages 2–19 years are obese, with obesity increasing nationally in all age groups under 19 since 1976.[1] Some recent regional studies suggest that the prevalence of childhood obesity may be stabilizing[2]; however, prevalence remains unacceptably high. Although there is increasing momentum for policy and environmental changes to reduce obesity by supporting improved nutrition and increased physical activity,[3,4] policy change can be slow and difficult. The need remains for effective, scalable, intensive interventions to influence lifestyle behaviors and prevent obesity. Schools are key settings for public health strategies based on the consistent, intensive contact teachers and staff have with children[5] and because of opportunities to engage children in healthy eating and physical activity and teach, model, and reinforce wellness messages.[6] Young adolescents are developing decision-making skills and building lifelong habits, making middle school an opportune setting for school-based intervention.[6]

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Large school interventions in the 1990s, such as the Child and Adolescent Trial for Cardiovascular Health (CATCH) and Planet Health®, were designed to combat cardiovascular risk and/or obesity and have shown promise in influencing knowledge, habits, and, to some degree, weight.[7,8] Recently, the HEALTHY study, a large, rigorous, school-based intervention, has also shown promising results for decreasing obesity-related risk factors for metabolic disease, albeit without significant increases in prevalence of healthy weight, compared to control.[9] The CATCH trial demonstrated successful sustained changes in select health behaviors, but not physiologic measures.[10] However, to date, interventions based in the middle-school years have not shown sustained intervention effects beyond young adolescence, and intervention effects achieved during the school year are often lost over the summer.[11]

Motivating Adolescents with Technology to CHOOSE Health™ (MATCH) is a teacher-developed, school-based childhood obesity intervention for seventh graders that began in 2007 in a rural, high-minority, economically challenged middle school in eastern North Carolina. Results immediately after the intervention and two years later were promising (88% and 99% participation rates each year; within the subset, among all overweight participants, BMI z-score changes were -0.08 and -0.04 each year, respectively).[12] The aim of this study is to examine long-term outcomes for the first two cohorts of adolescents participating in MATCH. Specifically, this study explores results of MATCH participation for obesity prevention by examining the changes in proportion of adolescents in each weight category at baseline and after four and five years and the rates of change in BMI measures over time, compared to a nationally representative sample with longitudinal BMI measures recorded at comparable intervals.

Methods

A single-site cohort pre- and postintervention study with longitudinal follow-up (MATCH) was compared to a nationally representative sample of similar-age children with height and weight recorded at near-concurrent intervals. The MATCH intervention has been described previously,[12] and key components of the model are shown in Table 1. MATCH integrates a health, nutrition, physical activity, and technology curriculum with the North Carolina Standard Course of Study for seventh-grade students to achieve health-related outcomes while simultaneously meeting state and national educational objectives. It is designed to be scalable and requires no additional school staff, minimal training, and low-cost additional materials (e.g., a workbook, pedometers, and small incentive items). It is aligned with the CDC school model, the Coordinated School Health Program,[13] and follows published recommendations for achieving a healthy weight.[14] MATCH included 55 contact hours provided over a period of 14–16 weeks and was specifically designed to reach rural, underprivileged, and minority youth.[12]

Intervention Group

In the 2006–2007 and 2007–2008 school years, all students enrolled in regular seventh-grade classes at one middle school in eastern North Carolina completed MATCH within routine school activities, and those assenting and with parents consenting were included in the research study ($N = 195$, 93% average participation rate). The original

Table 1. Components of the Motivating Adolescents with Technology to CHOOSE Health™ (MATCH) Intervention Educational Model

Key element of the MATCH educational model	Example intervention components
Conceptual knowledge (learn "why")	14-week interdisciplinary wellness lessons and activities embedded within standard curricula
Health skills (learn "how")	• Daily physical activity, pedometers
	• Self-tracking of physical activity
	• Food intake record and analysis
	• Energy balance activities
Individualized tasks (apply the skill)	• Calculate BMI, determine weight category
	• Fitness testing
	• Self-evaluation of health behaviors
Motivational strategies (reinforce the skill)	• Individual goal setting with action plans
	• Peer accountability contracts
	• Recognition bulletin board
	• Incentive items for achieving goals

study and intervention have been described previously.[12] The school is located in a rural North Carolina county where 24% of residents live in poverty and 43% are African American.[15,16] Nearly all of the students attending this middle school go on to attend one high school.

For this study, in January 2012, all 11th- and 12th-grade students (3.5 and 4.5 years post-MATCH, respectively) at the high school were invited by letter to have their height and weight measured at school. An ''opt-out'' consent/assent procedure was used, such that all students from the original study who were remeasured and did not return a signed ''opt-out'' form were included for analysis. To increase the likelihood of participation, an incentive, consisting of the opportunity to attend a MATCH celebration with the availability of an individual-portion ice-cream snack and drawings for backpacks, water bottles, and drawstring bags, was offered. Of the original 195 MATCH participants who were expected to be in the 11th or 12th grade, 66 were no longer at the school. Of the 129 eligible, nine opted out and 14 were either absent or declined remeasure. The final intervention group includes the 106 students remaining from MATCH (54% of the original cohorts, 82% of those available).

Gender, ethnicity (provided by parent upon school registration), and birth date were recorded from school files. Age was calculated from dates of birth and measurement. Height and weight measures (once at each time point with shoes off, wearing the standard school uniform; using calibrated scale) were done privately following a defined protocol. A Schorr stadiometer (Schorr Productions, Olney, MD) was used for all height measures, except for in spring 2007. A school nurse measured students in the intervention year. Follow-up measures were collected by a trained research team. BMI was calculated from height and weight and BMI z-score and BMI percentile for age and gender were determined from the standardized CDC charts. Weight category was assigned based on current CDC definitions.[17]

Comparison Group

The National Longitudinal Survey of Youth 1979 cohort (NLSY79) is a multi-purpose panel survey sponsored by the Bureau of Labor Statistics, US Department of Labor.[18] All data from NLSY are deidentified and available for research. The original cohort included a nationally representative sample of 12,686 men and women, oversampled for African American and Hispanic groups, who were 14–21 years of age on December 31, 1978. Starting in 1986, the children (NLSY79 Child Survey) of female respondents have been interviewed and assessed for height and weight every two years. At baseline, these were either measured by a nurse or the mother (53.3%) or reported by the mother (46.7%). At follow-up (age $\geq$14 years), height and weight were by adolescent self-report (NLSY79 Young Adult Survey).

Data from the 2006 NLSY79 Child Survey and the 2010 NLSY79 Child and Young Adult Surveys were obtained from the NLS Investigator website.[19] System ID, basic demographics (race, gender, and year of birth), age in months (child survey), age in years (young adult survey), date of survey, height (inches), weight (pounds), and method of height and weight assessment (measurement, mother report, and self report) were queried for children between 120 (10 years) and 179 (14.9 years) months of age at the time of their interview in 2006. The 680 children with birth years of 1993–1995 and having both height and weight values recorded in 2006 were eligible for inclusion; 600 of these also had height and weight values for 2010 and were included for analysis. This group is not intended to serve as a substitute for a ''control'' condition; rather, it represents changes in height and weight that reasonably would be expected in a diverse group of children without the MATCH intervention over time between ages 10 and 15 years.

Statistical Analysis

Because the study focus is changes at follow-up, only adolescents with both baseline and follow-up measurements were included. Baseline characteristics of those included and excluded were compared for each group using two-sample *t*-tests for continuous variables (age, BMI, BMI percentile, and BMI z-score) and chi-square tests (or Fisher's exact test, as appropriate) for categorical variables (gender and race). Similar statistical methods were also employed for comparing baseline characteristics between the MATCH and comparison groups.

Two-way tables were used to describe the weight-category distributions at baseline and follow-up for each group. Because of the nature of repeated-measure data, a generalized linear model with the GEE (generalized estimating equations)[20] method was used to study the percentage change of each weight category from baseline to follow-up and the difference between the two groups.

To account for differences in the length of follow-up time between the MATCH and comparison groups, outcome variables include changes per month in BMI, BMI percentile, and BMI z-score. These change rates per month were compared between the two groups using both two-sample *t*-tests and multiple regression models to control for other effects. The same comparisons were also done within each weight category. To further investigate how BMI changes among adolescents who were at the upper end of the healthy weight range at baseline, spaghetti plots were created to depict the BMI percentile change for each adolescent with 70th to $<$85th BMI percentile at baseline. Repeated-measures analysis of variance was used to compare the mean trend between the MATCH and comparison groups.

This study was approved by the university medical center institutional review board (#07-0741) at the Brody School of Medicine, East Carolina University (Greenville, NC).

Results

Table 2 shows the characteristics of the MATCH and comparison groups at baseline and demonstrates

Table 2. Baseline Participant Characteristics, MATCH Intervention and NLSY Comparison Groups

	Intervention group MATCH *N*=106 mean (SD)	Comparison group NLSY79 young adults *N*=600 mean (SD)
Age (months)	153.5 (5.78)	145.4 (10.09)
BMI	23.78 (6.08)	21.11 (5.42)
BMI percentile	76.71 (24.41)	65.04 (30.96)
BMI z-score	1.02 (0.99)	0.52 (1.33)
	***N* (%)**	***N* (%)**
Gender		
Female	60 (57)	282 (47)
Male	46 (43)	318 (53)
Race		
Nonblack/non-Hispanic[a]	39 (37)	317 (53)
Black	64 (60)	167 (28)
Hispanic	1 (1)	116 (19)
Asian	2 (2)	—

[a]NLSY categorizes race as black, Hispanic, or nonblack/non-Hispanic; participants in the MATCH group were categorized as white, black, Hispanic, or Asian.

MATCH, Motivating Adolescents with Technology to CHOOSE Health™; NLSY, National Longitudinal Survey of Youth; SD, standard deviation.

considerable differences. The MATCH cohort was older by 8.1 months, had higher mean BMI measures, greater percent female (57% vs. 47%), higher proportion black (60% vs. 28%), and almost no Hispanic participants (<1%), compared to the comparison group (19%).

For each group, baseline characteristics were compared for those excluded versus included for final analysis for both the MATCH ($n=89$ lost, 106 retained) and comparison ($n=80$ excluded; $n=600$ included) groups (Table 3). In the MATCH group, those retained were significantly younger at baseline, with a mean age 4.9 months younger than those lost to follow-up ($p<0.001$). There were no significant differences in age in the comparison group, as well as in either group for BMI measures, gender, and race or ethnicity.

Table 4 shows the proportion of adolescents in each weight category at both baseline and follow-up for the MATCH and comparison groups. Consistent with the high-risk, rural, low-resource community in which the middle school is located, at baseline, the MATCH group had higher prevalence of obesity, with over half of all adolescents being overweight or obese and none underweight; in contrast, the comparison group had just over one third overweight or obese and 5% underweight. In long-term follow-up, the weight category measures tended to improve more in the MATCH group than in the comparison, although differences between the groups only reached statistical significance in the overweight category. The percent healthy weight increased significantly in both groups, with MATCH increasing from 49% to 63% (increase of 14%), compared to 59–67% (increase of 8%) in the comparison group. Whereas the percent overweight in the MATCH group decreased from 20% to 12%, in the comparison group it increased from 17% to 19%. The percent obese decreased in both groups by approximately 6% (MATCH decreased from 31% to 25%; comparison decreased from 20% to 14%). The generalized linear model with the GEE method for each weight category showed that the increase in percent healthy weight and the decrease in percent obese were statistically significant for both groups ($p<0.001$), but no significant difference in these changes was found between the intervention and comparison groups. Within each group, the change in percent overweight was not statistically significant, but the change was found to be significantly different between the two groups ($p=0.03$).

Changes per month in BMI, BMI percentile, and BMI z-score were compared between the MATCH and comparison groups (Table 5). Overall, the MATCH group had significantly higher decrease rates in BMI z-score ($p<0.002$) and BMI percentile ($p=0.01$). Within the healthy weight category, the MATCH group was found to have a significantly lower increase rate in BMI ($p<0.001$) and significantly higher decrease rates in BMI z-score ($p=0.01$) and BMI percentile ($p=0.02$). For the obese category, the MATCH group had a higher increase rate in BMI ($p=0.02$) and lower decrease rates in BMI percentile ($p=0.04$) and BMI z-score ($p=0.02$). Multiple regression models were also attempted to control for effects of gender, ethnicity, and age in the above comparisons, but none of these were found to be statistically significant. Therefore, only results from two-sample *t*-tests are reported.

Figure 1 depicts the weight trajectory over time for the subset of individuals from the upper end of the healthy weight category from the MATCH and comparison groups who, at baseline, measured between the 70th and <85th BMI percentile. The mean trajectory is shown for each group with a bold line and reveals a steeper decline in the MATCH group ($p=0.01$); this significance level was maintained even after exclusion of the student in the MATCH group who had the largest decrease in BMI percentile (a drop from 84th to 13th percentile). In this healthy weight subset, no adolescents (0 of 18) from MATCH increased to overweight, whereas in the comparison group, 20% (22 of 108) increased to overweight or obese. This difference is statistically significant ($p=0.04$). Also, of all adolescents at healthy weight at baseline, 2% (1 of 52) from MATCH changed to overweight after five years,

Table 3. Baseline Characteristics of Participants Lost to Follow-Up/Excluded and Retained/Included in MATCH and NLSY Groups

	Lost to follow-up/excluded mean (SD)	Retained/included mean (SD)	Test for difference *t*-test *p* value
MATCH	*N* = 89	*N* = 106	
Age (months)	158.4 (9.99)	153.5 (5.78)	< 0.001
BMI	25.30 (6.89)	23.78 (6.08)	0.10
BMI percentile	79.10 (22.95)	76.71 (24.41)	0.48
BMI z-score	1.17 (0.96)	1.02 (0.99)	0.29
NLSY	*N* = 80	*N* = 600	
Age (months)	143.5 (11.15)	145.4 (10.09)	0.15
BMI	21.30 (6.00)	21.11 (5.42)	0.79
BMI percentile	64.84 (31.14)	65.04 (30.96)	0.95
BMI z-score	0.53 (1.34)	0.52 (1.33)	0.94
	***N* (%)**	***N* (%)**	**Chi-square test *p* value**
MATCH			
Gender			
Female	50 (56)	60 (57)	0.95
Male	39 (44)	46 (43)	
Race			
Asian	0	2 (2)	
Black	56 (63)	64 (60)	
Hispanic	1 (1)	1 (1)	0.51
White	30 (34)	39 (37)	
Native American	1 (1)	0	
Other	1 (1)	0	
NLSY			
Gender			
Female	44 (55)	282 (47)	0.19
Male	36 (45)	318 (53)	
Race			
Nonblack/non-Hispanic[a]	48 (60)	317 (52)	
Black	15 (19)	167 (28)	0.22
Hispanic	17 (21)	116 (19)	

[a]NLSY categorizes race as black, Hispanic, or nonblack/non-Hispanic; participants in the MATCH group were categorized as white, black, Hispanic, or Asian.

MATCH, Motivating Adolescents with Technology to CHOOSE Health™; NLSY, National Longitudinal Survey of Youth; SD, standard deviation.

whereas 13% (45 of 353) in the comparison group became overweight or obese over four years ($p = 0.02$).

Discussion

Despite small sample size, low retention rate in the MATCH group, and demonstrated differences not always reaching statistical significance, these results suggest that adolescents participating in MATCH sustained healthier BMI trajectories over time than may have been expected, given their high-risk environment, and nearly all who were healthy weight at the start did not progress to overweight. The comparison group represented expected growth in height and weight between middle-school– and

Table 4. Percent in Each Weight Category at Baseline and Follow-Up, MATCH and NLSY Comparison Group

	Weight status[a]	Baseline *N* %	Follow-up *N* %	Test of difference baseline to follow-up *p* value	Test of difference between groups *p* value
MATCH	Healthy weight	52 (49)	67 (63)	<0.001	0.33
	Overweight	21 (20)	13 (12)	0.38	0.03
	Obese	33 (31)	26 (25)	<0.001	0.29
	Underweight	0	0	—	—
Comparison	Healthy weight	353 (59)	400 (67)	<0.001	
	Overweight	100 (17)	111 (19)	0.38	
	Obese	117 (20)	81 (14)	<0.001	
	Underweight	30 (5)	8 (1)	—	

[a]Weight category determined by CDC definitions based on BMI percentile for age and gender: underweight, <5th percentile; healthy weight, 5th to <85th percentile; overweight, 85th to <95th percentile; obese, ≥95th percentile.

MATCH, Motivating Adolescents with Technology to CHOOSE Health™; NLSY, National Longitudinal Survey of Youth.

Table 5. Changes per Month in BMI Measures by Baseline Weight Category in MATCH vs. NLSY Comparison Groups

Baseline weight category		MATCH change per month mean (SD)	NLSY change per month mean (SD)	Test of difference *p* value
All	*N*	106	600	
	BMI	0.047 (0.053)	0.053 (0.078)	0.31
	BMI z-score	−0.004 (0.011)	0.000 (0.023)	0.002
	BMI percentile	−0.113 (0.328)	−0.018 (0.529)	0.01
Healthy weight	*n*	52	353	
	BMI	0.042 (0.038)	0.062 (0.054)	<0.001
	BMI z-score	−0.003 (0.013)	0.002 (0.017)	0.01
	BMI percentile	−0.121 (0.435)	0.044 (0.568)	0.02
Overweight	*n*	21	100	
	BMI	0.040 (0.047)	0.042 (0.086)	0.83
	BMI z-score	−0.006 (0.009)	−0.008 (0.016)	0.45
	BMI percentile	−0.167 (0.206)	−0.262 (0.415)	0.13
Obese	*n*	33	117	
	BMI	0.058 (0.073)	0.019 (0.118)	0.02
	BMI z-score	−0.004 (0.008)	−0.009 (0.015)	0.02
	BMI percentile	−0.064 (0.141)	−0.142 (0.299)	0.04

MATCH, Motivating Adolescents with Technology to CHOOSE Health™; NLSY, National Longitudinal Survey of Youth; SD, standard deviation.

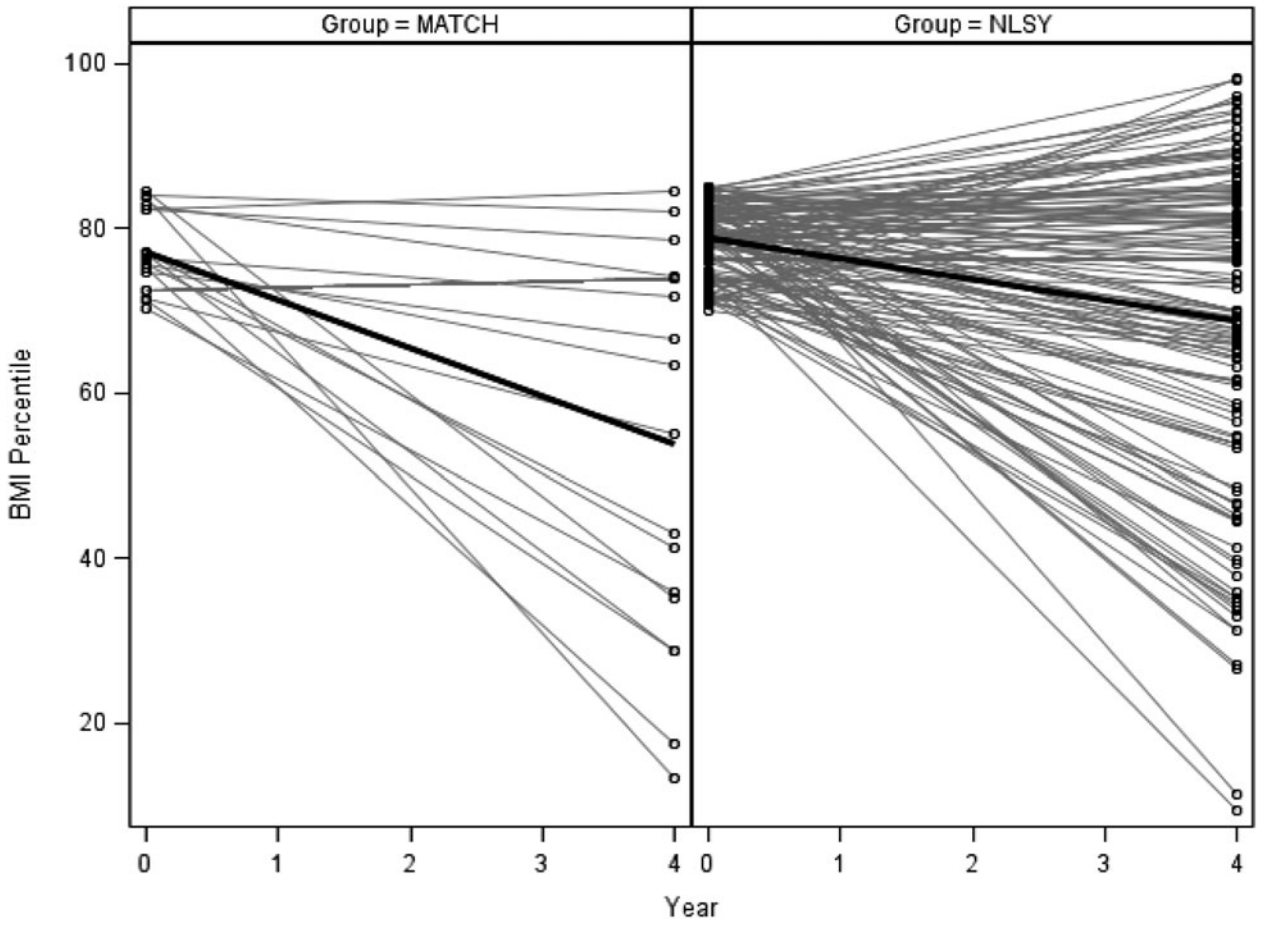

Figure 1. BMI percentile change over time in Motivating Adolescents with Technology to CHOOSE Health™ (MATCH) and National Longitudinal Survey of Youth (NLSY) comparison groups for adolescents at 70th to <85th BMI percentile at baseline. Bold line shows mean change over time; slope in the MATCH group shows more rapid decline ($p = 0.01$).

late-high-school–age adolescents across the nation, whereas the MATCH group was from an economically challenged county with a high minority population at very high risk of adult obesity. The question could be raised asking whether the students in MATCH were especially motivated because of some other factor or came from an unusually supportive environment for behavior change. However, this school district is not known to have highly involved Parent-Teacher Associations, energized faculty, additional physical activity or nutrition curricula, or other county-wide public health efforts that would have supported the students to reach healthier BMI trajectories.

One possible factor that may have contributed to the noted results, but also represents a potential barrier to replication, is the intensity of the curriculum (55 contact hours, of which approximately 20 were nutrition content, which is 5-fold greater than the 4.2 hours of nutrition education that is typically provided in middle schools, according to national survey data from the CDC).[21] It is also possible that the promising results are because of other statewide activities designed to reduce childhood obesity. Eat Smart Move More North Carolina, the state's obesity coalition, seeks to establish statewide obesity prevention policy and environmental change in North Carolina (NC), and substantive efforts have focused on nutrition and physical activity (PA) in elementary-school–age children. In addition, state school board policy requires 30 minutes per day of PA for middle school students, although it is not uniformly provided. MATCH participants did participate in PA of 25 minutes per day in grades 6–8, but not after. It seems that effects of these state-wide efforts should have been most evident at baseline and are unlikely to have had a sufficient effect on Martin County students to produce the promising results described. Similar increases in the proportion of older teens at healthy weight have not been described in other areas of the state.[22,23]

This study has several limitations that have been described previously.[12] The results are from one school with no control group, and the demographics of the school are not representative of urban, high-income, Hispanic, or Asian populations, so results may not be generalizable. No behavioral measures were completed pre- and post-MATCH, so the underlying possible mechanisms for the observed differences in BMI trajectory, such as specific changes in nutrition or physical activity behaviors, cannot

be investigated. Given the limited design, findings should be interpreted with caution.

Additional limitations are specific to this follow-up study. The comparison group used to represent expected growth in height and weight in adolescents over a similar time period was different in characteristics from the MATCH group. Because the MATCH group was from such a high-risk population, one would expect results to be worse in MATCH than in the comparison group; however, no differences associated with gender or race/ethnicity were found. To locate additional estimates of how mean BMI measures may be changing with age between 2006 and 2012 in other groups of young adolescents, available recent sources of cross-sectional BMI measures were examined.[2,24] When looking at mean measures in middle school or seventh-grade students and comparing to high school or 11th- and 12th-grade students, in general, the highest increases reported in the proportion of healthy weight students from schools ranged from 5% to 8% and thus, overall, were comparable to that found in the NLSY comparison group.

A final limitation is the relatively low retention rate of 54% in the MATCH group, although most of those adolescents not remeasured had moved out of the area or the school, as opposed to dropping out of the study. No statistically significant differences in baseline characteristics in those retained versus lost were found, even in BMI measures. Although no systematic differences that would affect results in those lost to follow-up were identified, it may have been that those lost were somewhat more overweight at baseline. Given the small sample size, if those lost to follow-up had worse weight trajectories than those retained, then the results in the MATCH group may be overestimating intervention effects.

This study also has several strengths. Preceding fairly recent, routine school-based measures of children, there have been few available data sets or obesity studies with longitudinal, measured height and weight measures. The sources most commonly cited for national prevalence estimates are from self-reported data,[25] and a known limitation of the CDC growth charts that define weight category is that they represent cross-sectional data.[26] Although the comparison group anthropometric data for this study were obtained from a combination of measures and self-report, a strength of the MATCH methods is that it includes measured longitudinal data at up to five years postintervention; to the knowledge of the authors, this is the longest reported longitudinal follow-up of a school-based intervention. In addition, the MATCH group represents a very high-risk population and results from an innovative, feasible strategy for obesity prevention.

Even considered with caution, the potential implications of these findings are noteworthy. These results suggest that the weight trajectories of young adolescents living in a high-risk environment for obesity can be modified. Participation in MATCH for some subset of adolescents may have led to sustained lifestyle changes and prevented future obesity. Although, because of study limitations, the result cannot be attributed to MATCH participation, the fact that over 98% of participants who were healthy weight at baseline remained so four or five years later suggests they achieved energy balance over an extended period, and the results were not affected by either gender or race/ethnicity. Several previous school-based studies, if improvements in BMI were achieved, found results to be inconsistent across demographic groups.[7,27,28]

Conclusion

MATCH was implemented in a school with very low resources and with students perceived as being at the highest risk for obesity. The curriculum and activities are theoretically driven, having been intentionally designed to apply social cognitive theory of self-regulation,[29] and fit *within* the standard course of study; thus, the curriculum may be adapted to other settings without substantial additional personnel or materials. After expansion to three and then six schools, MATCH is being implemented in 13 schools in North Carolina and four in South Carolina in the 2013–2014 school year. Future research is needed to rigorously test this model to prove effectiveness with controlled study, assess for accompanying behavior changes, investigate underlying mechanisms, and, if appropriate, further develop dissemination strategies to schools across different regions.

Strategies to address obesity will need to be broad based across community sectors, but also adaptable. Using a school-based model such as MATCH holds promise because once core educational elements and activities are identified, if adopted, they have the potential to reach substantial numbers of youth and prevent development of obesity.

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Author Disclosure Statement

No competing financial interests exist.

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