Effects of 12- and 24-Week Multimodal Interventions on Physical Activity, Nutritional Behaviors, and Body Mass Index and Its Psychological Predictors in Severely Obese Adolescents at Risk for Diabetes

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Abstract

Background: Although 7% of US adolescents have impaired fasting glucose, a precursor of type 2 diabetes, research has suggested that few interventions for obese adolescents at risk for diabetes have been effective. Therefore, pediatricians seek effective behavioral treatments for referral for this age group.

Objective: We wanted to determine the effects of two different durations of nutritional and exercise treatments on changes in nutrition, physical activity, body mass index (BMI), and psychological predictors of BMI change in overweight and obese adolescents at risk for type 2 diabetes.

Methods: We obtained data from 64 pediatrician-referred patients with diabetes risk factors (mean age, 14.1 years; BMI, ≥ 99th percentile.) Study participants were assigned to nutrition and exercise treatments for 12 weeks (n = 35) or 24 weeks (n = 29). A specific weight-loss goal was given only for the 24-week group.

Results: Both treatments demonstrated significant within-group changes over 12 weeks in days per week of physical activity of at least 60 minutes, physical self-concept, general self, and overall mood. However, they failed to demonstrate significant 12-week increases in fruit and vegetable intake, decreases in sweetened-beverage consumption, or decreases in BMI. Between-group differences were found only in mood changes in favor of the 12-week treatment. In the 24-week treatment, BMI change from week 12 to week 24 was significantly better than corresponding normative data (d = 0.37). Physical self-concept, general self, and mood scores at week 12 explained a significant portion of the variance in BMI change (R^2 = 0.13, p = 0.04).

Conclusion: Nutrition education alone may be insufficient for nutrition behavior change. Behavioral treatment lasting longer than 12 weeks and having a specific weight-loss goal may be useful for BMI improvements, and attention to participants' self-concept and mood may be important treatment considerations.

Introduction

In 2000, 7% of adolescents in the US had impaired fasting glucose, a precursor of type 2 diabetes.[1] An inappropriately high body weight is a major risk factor for the development of diabetes in youth.[2] Although it is also a problem for younger children, recent data indicate that more than one-third of US adolescents between ages 12 and 19 years are overweight (body mass index [BMI] in the 85th to 94.9th percentile) or obese (BMI ≥ 95th percentile), with the highest prevalence of obesity being in African-American teenagers at 24%.[3] It is suspected that an inadequate, high-calorie diet and a physically inactive lifestyle are largely to blame.[4] Objective analyses of physical activity of 12- to 15-year-olds suggest that only 8% obtain the minimum exercise level of 60 minutes on each of 5 days per week (a total of 300 minutes/week).[5] Analyses of adolescents' eating patterns suggest that consumption of an overabundance of sweetened beverages[6] and low consumption of fruits and vegetables[7] predicts overweight and obesity. Because it is a time of increasing independence from parents, adolescence presents an im-

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portant opportunity for establishing physical activity and eating patterns that will minimize health risks such as obesity throughout the life span.[8]

Because pediatricians are rarely able to dedicate sufficient time to each patient, they seek to refer adolescent patients with obesity and risks for diabetes to external treatment providers.[4] Overall, however, results of such treatments have been disappointing. Recent research suggests that only about 1 in 5 youth interventions studied since the mid-1980s were successful at significantly reducing gain in BMI, with effect sizes being smallest in those who were beginning adolescence.[9] Although increased physical activity and an improved diet are consistent strategies of overweight and obese adolescents successful at weight loss[10] and are included in virtually all interventions, a true picture of what is *specifically* required to reliably induce weight management in this age group remains unclear. For example, treatment approaches range from an emphasis on social support and acceptance of one's body, with nominal accountability for actual behavioral changes and results,[11,12] to a high focus on measurable short- and long-term goals, use of behavioral strategies (eg, positive self-talk, cognitive restructuring, stimulus control), and regular tracking of goal progress.[13]

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Regarding the nutritional component of interventions, some research points to the benefits of an educational approach,[14] whereas other studies suggest that a strong behavior-modification focus is critical.[15] Treatments may also be educational but have a high focus on specific nutrition behaviors such as consumption of fruits, vegetables, and sweetened beverages (eg, Type 2 Diabetes Intervention and Prevention Programs [TIPPs]).[16] Although some studies suggest that parental involvement is essential,[17] others indicate no additional effect on BMI.[9] The intervention component of promoting increased physical activity has also appeared in divergent forms. Information approaches intended to be palatable specifically to adolescents have been attempted,[18] whereas more invasive, behaviorally based methods that focus on building feelings of competence and improved feeling states through measurable progress have also been administered.[19] The Coach Approach protocol, for example, is an extensively tested exercise support protocol. It was originally intended for adults and seeks to increase physical activity through building self-regulatory skills to counter lapses, even in the face of barriers such as physical discomfort, self-consciousness, and slow progress.[20] Process goals such as increase in minutes spent doing physical activity each week are initially emphasized, with outcome goals such as a specific reduction in weight soon added. Research suggests that the induction of self-competence, self-esteem, and improved mood through usage of behavioral skills needed to maintain an exercise program also positively affects weight loss through carryover effects on eating behaviors.[21,22] Physical activity has also been shown to improve low mood,[23] which is associated with obesity in adolescents.[24]

The length of treatment required for meaningful improvements in weight is also unclear. Such data are needed for the development of comprehensive interventions that will also address maintenance of weight loss (which may require processes distinctly different from losing weight).[13,25] Although a meta-analysis demonstrated a surprising overall *inverse* relationship between treatment length (in weeks) and reduction in BMI gain,[9] effective interventions ranged widely from 5 to 84 weeks.[26–28] Effects were also significantly greater for girls than for boys in this research.[9] A meta-analysis of school-based interventions for youth suggested that treatments lasting longer than one year increased positive effects on obesity when contrasted with treatments of shorter durations.[29] The Coach Approach treatment demonstrated additional effects on physical activity at weeks 12 through 24 in individuals 18 years and older[30]; however, an intervention for 5- to 12-year-olds that was based on the same behavior-change principles demonstrated significant BMI improvements at only 12 weeks, with no difference in effects by sex.[31]

Thus, we decided that a preliminary study was warranted to investigate several of the treatment variables that are presently unclear regarding their effects on adolescents of an inappropriately high weight and at risk for diabetes. The study would incorporate into the protocol for each of the two tested groups a 12-week educationally based nutrition treatment component with parental involvement, emphasizing increased fruit and vegetable intake and reduced consumption of sweetened beverages (TIPPs).[16] Additionally, the Coach Approach protocol would serve as the physical activity support component and be abbreviated to 12 weeks in one group and would be incorporated for its full 24 weeks in the other. Only the group with 24 weeks of treatment would have a specific amount of weight loss designated as a goal. This is consistent with Coach Approach processes that emphasize such outcome goals in weeks 12 through 24. A YMCA setting would be used for treatment administration to increase generalizability of

findings, which we deemed to be an important consideration.[32] We would assess changes in a 12-week period in physical activity, fruit and vegetable intake, consumption of sweetened beverages, physical self-concept, general self, overall mood, and BMI, as well as longer-term effects on physical activity and BMI for the 24-week group. Additionally, we would evaluate physical self-concept, general self, and mood for their ability to predict short-term change in BMI. We hoped that the results of this preliminary investigation would help to inform future, more comprehensive, research where findings might ultimately be applied to treatment design, duration, and administration methods, and that our results would also contribute to theory related to psychological factors' effects on weight management.

Methods

Participants

Pediatricians referred patients fulfilling the inclusion criteria to health-promotion administrators from Children's Healthcare of Atlanta, who then contacted parents or guardians to determine interest in participation. Inclusion criteria were 1) age of 12 to 17 years, 2) age- and sex-adjusted BMI ≥ 85th percentile, 3) an additional risk factor for diabetes (a list of possible risk factors that included race/ethnicity, family history, and conditions associated with insulin resistance [eg, acanthosis nigricans, hypertension, and dyslipidemia] was provided to the physicians), and 4) willingness of parents or guardians to attend scheduled classes concerning their child's nutrition and physical-activity needs. A written statement of sufficient health to participate was also required from the referring physician.

Group assignment was based on date of referral. Approximately 80% of referred patients and their parents or guardians accepted the offer to participate at no cost to them. Group 1 (n = 35) and group 2 (n = 29) did not significantly differ on sex (overall composition, 69% female), age (overall mean, 14.1 years; standard deviation [SD], 1.8), BMI (overall mean, 37.5 kg/m^2; SD, 7.0, which corresponded to above the 99th age- and sex-adjusted percentile for BMI), or ethnic or racial group make-up (overall composition: 8% white, 90% African American, and 2% of other ethnic or racial groups). Written informed consent was obtained from parents or guardians, and written assent was obtained from participants. Appropriate approval was received from the institutional review board of Children's Healthcare of Atlanta.

Measures

All surveys were intended by their developers for the study's age group and/or previously used in related research with that same age group.

Nutrition—Two items from the Food Frequency Questionnaire for Youth[33] were used to recall the combined number of fruits and vegetables typically consumed per day at the time of survey administration. One item was used to recall the number of sweetened beverages consumed per day. Examples of possible fruits, vegetables, and sweetened beverages were given in corresponding items. Items were similar to those in the Behavioral Risk Factor Surveillance System.[34] Responses ranged from "3 or more times a day" to "never." Test-retest reliabilities over 48 hours ranged from 0.67 to 0.77.[33]

Physical Activity—An item adapted from the Youth Risk Behavior Survey[34] was used to measure the number of days "over a typical or usual week" that the respondent was "active for a total of at least 60 minutes per day" (excluding physical education classes). A minimum of 60 minutes is the recommended daily duration of moderate-to-vigorous physical activity for children and adolescents.[35] Instructions were to include any kind of physical activity that increased heart rate and caused hard breathing "at least some of the time." The directions required physical activity during physical education to be excluded because as with recent research,[36] physical activity carried out of one's own volition (rather than because it was mandated) was of primary interest.

Physical Self—The Physical Self-Concept Scale, a subscale of the Tennessee Self-Concept Scale: 2 Child Form,[37] measures feelings of adequacy regarding the physical self. Responses for the 12-item scale (eg, "My body is healthy") range from 1 (always false) to 5 (always true). Internal consistency for adolescents averaged 0.70, and test-retest reliability during a one-week period was 0.71.[37] Validity was supported through significant correlations between Physical Self-Concept Scale scores and scores on the Piers-Harris Children's Self-Concept Scale and other generally accepted inventories of physical characteristics and activities.[37]

Overall Self—The General Self Scale is a subscale of the Self-Description Questionnaire.[38] It measures an adolescent's perceptions of his or her overall self. The eight-item scale (eg, "Overall I have a lot to be proud of") requires responses that range from 1 (false) to 5 (true). Internal consistency of the scale was 0.81.[38] Although usual test-retest

methods were considered inappropriate because of expected changes in the measured construct over time, findings suggested systematic change during a six-month period.[38] Validity was supported through significant correlations between General Self Scale scores and scores on the Perceived Competence Scale and other well-accepted inventories of the overall self.[38]

Mood—Total Mood Disturbance is an aggregate measure of mood derived from the six subscales of the Profile of Mood States—Short Form.[39] Respondents rate feelings that occurred "over the past week" on 30 items ranging from 0 (not at all) to 4 (extremely). Internal consistency for the Tension, Depression, Fatigue, Confusion, Anger, and Vigor subscales ranged from 0.84 to 0.95, and test-retest reliability at three weeks averaged 0.69.[39] Concurrent validity was suggested through contrasts with generally accepted measures such as the Beck Depression Inventory, Manifest Anxiety Scale, and Minnesota Multiphasic Personality Inventory.[39]

Body Composition—A digital scale and stadiometer were used to calculate BMI, an estimate of health risks associated with body fat, which is derived from a ratio of weight to height (kg/m^2). Correlations with the most precise measure of body fat, dual energy x-ray absorptiometry, have been reported as ranging from 0.80 to 0.90 in other studies.[40] Recent research suggests that for children, direct measurement of BMI change is advantageous, rather than adjustment of BMI by percentile or *z*-score.[41] However, we also used age- and sex-adjusted BMI percentile data, which were based on data from the National Center for Health Statistics,[42] for descriptive purposes. A BMI change score for each participant was derived by subtracting the score at baseline from the score at week 12.

Procedure

For both groups, participants and at least one parent or guardian reported to the YMCA that served as the experimental facility for a brief orientation with a study administrator. Components of either the 12-week (group 1) or 24-week (group 2) treatment process were described to them on the basis of their date of referral. For both groups, the 12-week TIPPs protocol[16] was the basis of the nutritional portion of the treatment. It included six 30-minute group classes for parents and six 45-minute group classes for participants and their parents or guardians (on alternate weeks) that were lead by specially trained registered dietitians. Structured education and interaction on topics such as "Building a Healthy Plate," "Beverages for Teens," "Healthy Snack Sharing," "Parents as Role Models," "Meal Planning/Grocery Shopping," and "Recipe Sharing" was provided and supported by interactive workbooks. The dietitians were also available for brief individual consultations if requested by participants or their parents or guardians. Throughout the treatment, appropriate eating, with a specific focus on reducing consumption of sweetened beverages and increasing fruit and vegetable consumption, was emphasized.

The Coach Approach protocol[20] was the basis of the physical activity support portion of the treatment. It was administered by a trained YMCA wellness specialist via a series of monthly one-on-one meetings, guided by a computer program. The Coach Approach has previously been associated with increased physical activity in adults with and without obesity.[30] Duration of the Coach Approach treatment was reduced to 12 weeks (four meetings) for group 1. It was for the usual 24 weeks (six meetings) for group 2. Within the meetings, a focus was kept on specific goals. Although short-term goals were kept process-orientated (eg, increase cumulative cardiovascular exercise from 150 to 250 minutes per week within one month) for the initial 12 weeks, outcome-orientated goals (eg, lose 5 lb [2.3 kg] per month) were added in the final 12 weeks for group 2. At least 5% weight loss by treatment termination (week 24) was incorporated as a long-term outcome goal for all participants in group 2. Physical activity data were entered electronically so that goal progress could be highlighted.

A behavioral contract to complete an agreed-on volume of regular exercise, along with training in an array of self-management and self-regulatory skills such as cognitive restructuring, stimulus control, and relapse prevention, was included within meetings. Physical activity modalities and volumes were selected in cooperation with an exercise specialist and revised on the basis of individual progress. Participants were free to use all YMCA exercise facilities anytime or, alternatively, exercise outside of the facility. Typical exercise regimens included use of treadmills, stationary bicycles, and resistance bands; however, physical activities such as group exercise classes, walking on a track, or swimming could also be selected.

Treatment fidelity was monitored by a study administrator. Physiological tests and surveys were administered at baseline and at week 12 in a private area, and participants' identifying data were

removed. Only BMI and physical activity level were also recorded at week 24 (for group 2).

Data Analyses

Statistical significance was set at $\alpha = 0.05$ (two-tailed). Consistent with recent related research,[43] imputation due to missing data (for the 8% of missing cases overall) was by the last-observation-carried-forward method. Missing BMI scores were additionally adjusted for expected increases associated with maturation.[42] Analyses of skewness and kurtosis suggested that the data were distributed approximately normally, and thus use of parametric statistical testing was appropriate. Because of the exploratory nature of this small-sample field investigation, and recent suggestions,[44] there were no statistical adjustments for multiple tests.

A series of mixed-model repeated-measures analyses of variance (ANOVAs) were first conducted to determine whether changes during the 12-week period in physical activity level, consumption of fruits and vegetables, number of sweetened beverages consumed, and scores on the Physical Self-Concept Scale, Total Mood Disturbance, and General Self Scale were significant, and, if so, whether those changes significantly differed by group. Next, consistent with previous research,[31] changes in BMI were contrasted with expected changes that were based on the age-, sex-, and (baseline) BMI-adjusted values from normative growth charts.[42] Group differences in effects were also assessed. Finally, to investigate the ability of the psychological factors focused on within the treatments to account for short-term changes in BMI, data from both groups were aggregated and a multiple-regression model, with simultaneous entry of scores of Physical Self-Concept Scale, Total Mood Disturbance, and General Self Scale at week 12 as predictors of change in BMI, was calculated.

Results

Changes in Behavioral and Psychological Variables

There were no significant between-group differences in physical activity level, consumption of fruits and vegetables, number of sweetened beverages consumed, and Physical Self-Concept Scale, Total Mood Disturbance, General Self Scale and BMI scores at baseline. There were no significant improvements during the 12 weeks in consumption of fruits and vegetables scores (F [1, 62] = 0.36; p = 0.55) or number of sweetened beverages consumed (F [1, 62] = 3.54; p = 0.07). There were significant improvements in physical activity level (F [1, 62] = 68.27; $p < 0.001$; $\eta^2 = 0.524$), and Physical Self-Concept Scale (F [1, 62] = 9.73; p = 0.003; $\eta^2 = 0.135$) and General Self Scale (F [1, 62] = 25.19; $p < 0.001$; $\eta^2 = 0.289$) with no significant between-group differences. Improvements in Total Mood Disturbance scores were significant (F [1, 62] = 36.68; $p < 0.001$; $\eta^2 = 0.355$), with group 1 demonstrating significantly greater improvements (F [1, 62] = 4.62; p = 0.04; $\eta^2 = 0.045$; see Table 1 for descriptive statistics). A planned within-group contrast indicated that physical activity level at week 24 was not significantly different from that at week 12 (for group 2).

Table 1. Descriptive statistics for behavioral and psychological variables, plus body mass index (BMI)

Parameter	Baseline		Week 12		Week 24	
	Mean	SD	Mean	SD	Mean	SD
Physical activity level[a]						
Group 1	1.74	1.60	3.31	1.49		
Group 2	1.97	1.09	3.55	1.21	3.67	1.19
Combined number of fruits and vegetables						
Group 1	2.71	0.86	2.77	0.94		
Group 2	3.03	0.94	2.83	1.10		
Number of sweetened beverages consumed per day						
Group 1	2.03	1.25	1.97	1.15		
Group 2	2.52	1.38	1.93	1.10		
Physical Self-Concept Scale						
Group 1	38.71	6.29	41.14	6.73		
Group 2	39.52	4.39	41.45	5.52		
Total Mood Disturbance						
Group 1	11.51	14.19	–1.89	11.59		
Group 2	7.44	8.74	1.07	11.70		
General Self Scale						
Group 1	30.57	4.83	33.06	5.06		
Group 2	32.14	4.68	35.00	3.51		
BMI						
Group 1	36.51	7.63	36.63	7.60		
Group 2	38.80	6.14	38.88	6.07	38.35	5.44

[a] Active for a total of at least 60 minutes per day.
Group 1, n = 35; group 2, n = 29.
SD = standard deviation.

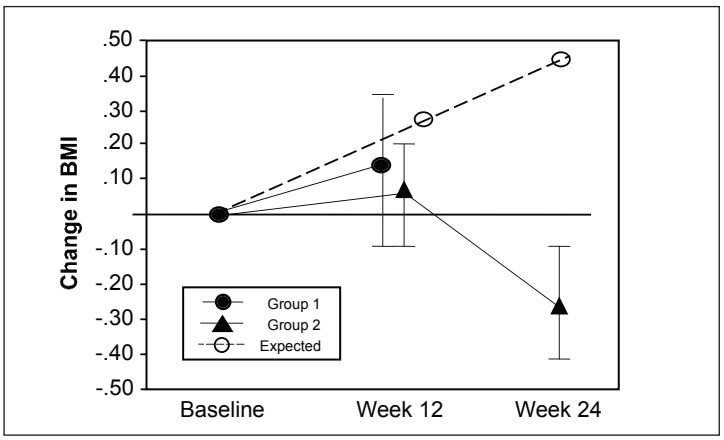

Figure 1. Contrast of expected changes in body mass index (BMI) with observed changes in group 1 and group 2.

Changes in Body Mass Index

When contrasted with normative changes in BMI during the 12-week period (mean, 0.23), changes in both group 1 (mean, 0.12; SD, 1.39) and group 2 (mean, 0.08; SD, 0.81) were not significantly different (t [34] = 0.46; p = 0.64; d = 0.05; 95% confidence interval [CI] = –0.59 to 0.37 and t [28] = 1.00; p = 0.33; d = 0.19; 95% CI = –0.46 to 0.16, respectively). In an analysis of group 2 only, BMI changes during the 24-week period (mean, –0.27; SD, 1.20) were significantly more favorable than normative changes (mean, 0.46) during the same period (t [28] = 3.28; p = 0.003; d = .38; 95% CI = –1.19 to –0.27) and were also more favorable from week 12 to week 24 (mean, –0.35; SD, 0.96) when contrasted with normative changes (mean, 0.23) (t [28] = 3.25; p = 0.003; d = 0.37; 95% CI = –0.95 to –0.21) (Figure 1).

Prediction of Body Mass Index Change

A significant 13% of the variance in BMI change was accounted for by simultaneous entry of Physical Self-Concept Scale, Total Mood Disturbance, and General Self Scale scores at week 12 into a multiple-regression equation (Table 2, model 1). There was no difference in the variance in BMI change explained, adjusted for number of predictors (R^2_{adj}), by adding group membership into the equation (Table 2, model 2).

Table 2. Results of simultaneous multiple-regression analyses for the prediction of changes in body mass index (BMI) in all participants (n = 64)

	β	R	R^2	R^2_{adj}	F	df	p
Model 1		0.36	0.13	0.09	3.04	3, 60	0.04
Physical Self-Concept Scale	–0.25						0.11
Total Mood Disturbance	0.28						0.04
General Self Scale	0.36						0.03
Model 2		0.39	0.15	0.09	2.61	4, 59	0.05
Physical Self-Concept Scale	–0.27						0.09
Total Mood Disturbance	0.32						0.03
General Self Scale	0.41						0.01
Group	–0.14						0.27

Scores of psychological variables are at week 12.
Adjusted R^2 (R^2_{adj}) = 1 – (1 – R^2) (N – 1)/(N – k –1), where k denotes number of predictors in the regression model.

Post Hoc Analyses

Effects of Sex—To test whether sex affected the various relationships, we conducted additional analyses. Linear bivariate correlations indicated that participants' sex was not significantly associated with physical activity level, consumption of fruits and vegetables, number of sweetened beverages consumed, Physical Self-Concept Scale, Total Mood Disturbance, General Self Scale, or BMI scores at week 12 (r values, –0.10 to 0.14) or with changes from baseline to week 12 (r values = –0.22 to 0.23). Additionally, accounting for the longer time frame for group 2, physical activity level and BMI were similarly not significantly related to participants' sex at week 24 (r = –0.20 and 0.20, respectively) or change during the 24-week period (r = –0.17 and –0.09, respectively).

Frequency of Recommended Volumes of Physical Activity—In contrast to the expected 8% frequency of the recommended 5 days per week of ≥ 60 minutes of moderate-to-vigorous physical activity for population-based data for the participants' age range,[5] participants' corresponding data at the aforementioned criteria were 2% at baseline, 16% at week 12, and 17% at week 24.

Discussion

In our samples of severely obese adolescents, referred to interventions because of their risk for diabetes, we found useful preliminary findings. Both of the treatments consisting of nutrition education and support of increased exercise through cognitive-behavioral means were associated with equivalent, significant increases in reported days per week of 60 minutes of voluntary exercise and significant

improvements in perceptions of the physical and overall self and overall mood. BMI did not significantly decrease within 12 weeks; however, in the 24-week treatment that included a specific goal of 5% weight loss, significant BMI decreases emerged during weeks 12 through 24. It is unclear whether the extended treatment or the mandated outcome goal (or both) was associated with this significant effect. It seemed clear, however, that three months of treatment *was not* sufficient for significant BMI change to occur overall. The Physical Self-Concept Scale, General Self Scale, and Total Mood Disturbance scores at week 12 significantly predicted change in BMI. Although this suggests that these psychological factors should be an important focus of interventions, it was not clear what, specifically, in the treatments induced these changes. They were, however, consistent with findings of the Coach Approach treatment with adults.[20] Because there is a dearth of related research with samples like ours, considerable study is still needed of the association of treatment-induced changes in psychological variables such as self-efficacy, self-concept, body image, anxiety, and depression, and weight loss; what treatment components maximize these effects; and their impact on physical activity, eating, and weight loss.

Because the treatments that we used failed to significantly increase intake of fruits and vegetables and to reduce consumption of sweetened beverages, researchers should seek methods to reliably accomplish these and other important nutritional outcomes for subgroups similar to that of this study. Because our intervention focused on nutrition education without establishing limits in caloric consumption, extensions of this research may seek to evaluate nutritional approaches with a more cognitive-behavioral focus, where specific parameters are provided and self-regulatory skills are a central part of the intervention. The role of parents and guardians also remains unclear and warrants additional research attention. Although treatment components effectively addressing both nutrition and physical activity appear necessary to increase the minimal improvement in BMI observed here, further research into the effects of exercise-induced psychological changes' association with reductions in caloric intake has recently been suggested[45] and will be important in future studies with youth at risk for diabetes.

Because of the field nature of this research and because of logistic limitations, provisions were not made for follow-up data for group 1 or for data collection beyond 12 weeks in nutrition and psychological variables for group 2. Future research should extend data collection to establish longer-term treatment effects. Also, this study's participants were primarily African American and had quite severe obesity. Thus, replication with larger and more diverse samples is required to increase confidence in findings and test their generalizability. The applied setting also did not allow control of factors such as social support and expectation effects emanating from instructors or other participants. Practical settings such as used here, however, have been specifically advocated because of the ease in generalizing findings to treatments.[32]

In summary, findings suggested that areas for extending treatment research with obese adolescents with diabetes risk factors include intervention content and length and predictors of effects on BMI and eating behaviors. After further focused research and intervention trials, pediatricians may have increased confidence in referring their obese adolescent patients with additional diabetes risk factors to efficient and reliable external treatments. Until then, it appears that nutrition and exercise treatments lasting longer than three months, with a behavior-change focus that is sensitive to participants' self-concept and mood, are prudent for referral. We suggest that professionals with a medical focus, behavior change focus, and program implementation focus coordinate their efforts to reliably improve health behaviors in youths with modifiable health risk factors. ❖

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Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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A Life Sentence

"Tell me about the benefits of obesity." I asked them.
"What are the advantages of being fat?"

He had been quiet up to now, sitting in the back row
of the bariatric surgery group, arms folded across his belly.

"It don't last as long," he said.

Confused, I asked, "What doesn't last as long?"

"Your life." he answered.

—Vincent J Felitti, MD, FACP, retired Internist from the Department of Preventive Medicine at the Clairemont Mesa Medical Office in San Diego, CA.