

Original article

Long-term Evaluation of Multi-disciplinary Treatment of Morbid Obesity in Low-income Minority Adolescents: La Rabida Children's Hospital's FitMatters Program

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Abstract

Purpose: Long-term evaluation of an empirically based program for the treatment of morbidly obese, low-income, minority adolescents.

Methods: In the first year, 150 participants received cognitive-behavior therapy, nutritional education, medical monitoring, and structured exercise training. Weights and heights were collected at follow-up. Successful and Less Successful groups were delineated based on change in body mass index z -scores. Medical record review provided weight and height data one year before treatment for a subset of participants (comparison group). Analyses of variance examined differences between groups. Discriminant function analyses examined predictors of success in the domains of socioeconomic status, individual factors and psychological functioning, family factors, and prior weight loss behaviors. Correlates of success were explored.

Results: Eighty-three adolescents participated in the follow-up, on average 23 months ($SD = 3.8$) after initial assessment. Nineteen (23%) participants achieved clinically meaningful weight change (-0.70 z -scores or better). Discriminant function analyses, correlations, and direct comparisons showed that the Successful group, compared with the Less Successful group, on average, attended 50% more sessions over 84% more weeks, were heavier initially, had somewhat better critical weight control skills (e.g., self-monitoring) before and during the program, and were somewhat more psychologically and intellectually challenged before treatment.

Conclusion: Although some of these very high risk adolescents made clinically significant progress, more intensive treatments, like long-term residential treatments and bariatric surgery, may produce even more favorable outcomes. © 2006 Society for Adolescent Medicine. All rights reserved.

Keywords:

Obesity; Treatment; Behavior; Low-income; Minority; Pediatrics; Adolescents; Self-monitoring; Parental involvement; Psychology

The World Health Organization recently declared that obesity has become a global epidemic [1]. In the United States alone, approximately 61% of adult Americans are now either overweight (34%) or obese (27%) [2]. The global epidemic of obesity takes its greatest toll among

minority children and adolescents. The prevalence of overweight children and adolescents doubled from 1980 to 1994 (5% to 10%) [3]. More recently, this trend has accelerated: As of 2000, approximately 15% of six-through 19-year-olds were overweight [4]. This acceleration was particularly marked for Hispanic and African American adolescents. The prevalence in these groups doubled between 1994 and 2000; approximately 13% of Caucasian adolescents were overweight in 2000 vs. 23% of Hispanic and African American adolescents. Such

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overweight adolescents are 10 times more likely to become obese adults than their lean peers [5]. Overweight adolescents develop Type II diabetes and cardiovascular problems much more so than their lean peers during childhood and the medical consequences of excess weight among adults (e.g., cardiovascular disease, cancer) are significantly greater in those who were overweight as adolescents [6]. In addition, overweight adolescents, as well as overweight adults, suffer from a remarkably unfavorable stereotype (e.g., stupid, socially inept, lazy) that can produce negative global as well as appearance-related self-images and increased probability of depression, nervousness, and high-risk behaviors as they get older [7,8].

The accelerating rates of obesity among minority children and their many adverse consequences (including billions of dollars in health care costs) [9] suggest that aggressive interventions for obese minority adolescents should be a high priority among health care professionals. Unfortunately, the extant research suggests that most methods used to help people lose weight, including balance-deficit diets (expending more calories than consumed), very low calorie diets (VLCD), and bariatric surgery produce significantly less success among minority participants when compared with Caucasians [10]. The reasons for this differential ineffectiveness could include that poorer families experience greater instability in the home, worse nutritional management, and more favorable or accepting attitudes toward obesity [11–13]. In addition, multivariate analyses, controlling for socioeconomic status, indicate that a crisis of unhealthy nutritional behavior exists in many minority communities that cannot be explained by poverty alone [14]. These factors make the formidable challenge of successful treatment of obesity considerably more difficult, but no less urgent, in low-income minority communities.

The purpose of this study was the long-term evaluation (two years after beginning treatment) of an intensive program (with a goal of one year of treatment) focused on treatment of morbid obesity (100 pounds or more overweight) among low-income minority adolescents. This evaluation focused on identifying those adolescents who made clinically significant progress (2.5% or greater change in weight) in terms of weight change and determining predictors of that change. In view of the notoriously refractory nature of morbid obesity, particularly among low-income minority children and families, it was hypothesized that many adolescents would have difficulty using this approach to achieve substantial changes. However, it was also expected that children who had relatively supportive family environments and greater abilities to focus on this issue (e.g., relatively low emotional distress; better initial eating habits) would be more likely to achieve clinically significant changes in their weight.

Methods

Program description

La Rabida Children's Hospital has provided comprehensive care for low-income children with chronic illnesses for more than 100 years. Because a great many children seen regularly at the hospital for management of diabetes, asthma, and related conditions were obese, in 2000 a comprehensive program, FitMatters, was established to help adolescents and their families learn how to manage obesity in this high-risk population. FitMatters is a multidisciplinary approach involving cognitive-behavioral therapy, nutritional counseling, exercise therapy, and medical management. To enroll in the program, the child must be eight years of age or older and be at the 95th percentile or older of body mass index (BMI) for gender and age.

In the construction of this program, an empirical basis was used for each component to maximize the likelihood of effectiveness. For example, the cognitive-behavioral therapy (CBT) component was developed in view of Haddock et al's [15] meta-analysis involving 41 controlled treatment outcome studies with children. These authors found that CBT "emerged as a treatment of choice for childhood and adolescent obesity" (p. 235). Accordingly, the following empirically justified components of CBT [16] were incorporated in FitMatters:

1. A thorough initial assessment of psychological issues;
2. Medical assessment and monitoring;
3. Thorough education about relevant cognitive-behavioral techniques and principles (e.g., self-monitoring, stimulus control, anxiety management, coping and relapse prevention training);
4. A complete nutritional assessment and educational program;
5. Emphasis on increasing exercise, including lifestyle exercise goals (e.g., 10,000 steps per day as recorded on a pedometer) and a 12-week exercise program conducted by physical therapists;
6. Staff who are well trained in CBT;
7. Long-term treatment, i.e., weekly small group (n = 3–6) sessions (children seen alone for 30–45 minutes and then parents seen for 20–30 minutes) targeted for at least one year;
8. An emphasis on promoting social support and managing social environments (e.g., direct parental involvement as a requirement).

Participants

Table 1 provides a description of the characteristics of the overall program participants, the current study participants and nonparticipants, and the comparison group subset. Due to significant variations in BMI percentiles throughout childhood, BMI z-scores were computed from the child's

Table 1
Participants characteristics

(M [SD]) unless otherwise indicated	FitMatters Program participants (n = 150)	Study nonparticipants (n = 67 of 150)	Follow-up study participants (n = 83 of 150)	Comparison group (n = 29 of 83)
Demographic factors				
Gender (%)				
Male	51 (n = 76)	51 (n = 34)	51 (n = 42)	66 (n = 19)
Ethnicity (%)				
African-American	88 (n = 132)	84 (n = 56)	92 (n = 76)	97 (n = 28)
Hispanic	6 (n = 9)	7 (n = 5)	5 (n = 4)	3 (n = 1)
Other	6 (n = 9)	9 (n = 6)	3 (n = 3)	-
Family SES	39.89 [14.32]	40.97 [13.42]	39.10 [15.01]	40.69 [15.13]
Age in years	12.90 [2.5]	12.87 [2.4]	12.95 [2.4]	12.62 [2.46]
Intellectual functioning (K-BIT standard score)	89.94 [19.95]	89.00 [22.0]	91.00 [17.63]	91.50 [20.02]
Weight measures				
Weight in kg	115.50 [39.54]	114.59 [43.11]	116.24 [36.68]	110.54 [35.18]
Height in cm	25.25 [1.64]	25.47 [1.81]	25.01 [1.44]	24.99 [1.38]
Body mass index (kg/m ²)	43.61 [12.60]	43.45 [12.94]	43.75 [12.38]	42.08 [12.85]
BMI z-score	6.03 [3.25]	6.03 [3.37]	6.03 [3.17]	5.91 [3.37]
Potential predictors				
Child Behavior Checklist (T-scores)				
Somatic	69.66 [10.92]	69.51 [11.59]	69.76 [10.53]	70.00 [9.54]
Anxious/depressive	59.39 [8.87]	57.98 [7.22]	60.38 [9.80]	61.96 [10.69]
Aggressive	60.27 [9.57]	59.92 [9.07]	60.52 [9.98]	59.88 [9.70]
Youth Self-Report (T-scores)				
Somatic	58.48 [5.78]	58.87 [6.21]	58.20 [5.49]	59.16 [7.56]
Depressive	55.68 [3.16]	55.50 [2.44]	55.81 [3.59]	56.86 [5.65]
Aggressive	58.24 [6.69]	59.55 [7.12]	57.32 [6.26]	58.24 [8.64]
Conflict Behavior Questionnaire (percentile)				
Child rating mother	60.49 [26.16]	63.88 [25.82]	58.16 [26.36]	54.50 [23.16]
Child rating father	70.95 [30.77]	75.06 [29.81]	67.89 [31.42]	63.82 [32.27]
Mother rating child	68.54 [28.21]	68.21 [27.08]	68.78 [29.23]	66.64 [31.47]
Weight Control Habits (11 items, 5-point Likert scale)	29.72 [7.05]	29.80 [7.62]	29.66 [6.62]	29.14 [8.24]
Current Exercise Survey (calories in exercise during previous week)	2423.98 [3327.31]	2136.70 [2653.07]	2652.10 [3782.39]	2623.88 [4477.34]
Eating Self-Efficacy (25 items, 7-point Likert scale)	72.44 [36.91]	69.07 [34.64]	74.68 [38.44]	81.50 [47.87]
Binge-Eating Scale (9 items, 0–3 points)	5.36 [4.66]	4.45 [4.39]	6.07 [4.78]	7.41 [5.07]
Child's readiness to participate (7-point Likert scale)	6.31 [1.07]	6.13 [1.22]	6.45 [0.92]	19.64 [33.00]
Child's importance of losing weight (7-point Likert scale)	6.48 [1.02]	6.47 [1.14]	6.49 [0.94]	19.57 [33.03]
Process measures				
Consistency of self-monitoring				
Child (average days per week for first 3 months)	2.46 [1.82]	2.23 [1.79]	2.56 [1.84]	3.01 [1.66]
Parent (average days per week for first month)	.45 [1.22]	.30 [0.90]	.45 [1.22]	.46 [1.06]
Attendance				
Number of sessions attended	9.50 [12.08]	6.42 [8.01]	12.00 [14.51]	12.07 [14.76]

BMI at assessment and national BMI means and standard deviations according to gender, ethnicity, and age [17].

The procedures followed were in accordance with the ethical standards of the University of Chicago Institutional Review Board for Human Subjects.

Measures

A thorough initial psychological assessment was conducted with each family, focusing on potentially critical

process measures and hypothesized correlates of success. Height and weight measures were also collected at initial assessment, as well as at weekly group therapy sessions.

Process measures. These were the variables that were expected to change in order to produce the desired biological outcomes. They included: consistency of child and parental self-monitoring (i.e., weekly rating by the therapist, checked for reliability [95%], of the extent to which all foods and

exercise were recorded by participants and their parents) [18,19]; and number of sessions attended.

Potential correlates of success. Additional potential mediators of behavior change were assessed during the initial psychological evaluation. These included behavioral and emotional stability of the child (Achenbach Child Behavior Checklist (CBCL)/Youth Self-Report (YSR) [20]) and degree of perceived conflict in the family (Conflict Behavior Questionnaire [21]). Pretreatment weight control and health behaviors were assessed, including current weight control habits (Weight Control Habits Survey) [22,23]; ratings of exercise levels in the week before assessment (Current Exercise Survey) [24]; eating behaviors (Eating Self-Efficacy Scale [25] and the Binge Eating Scale [26]); and ratings by the children of their readiness to participate and the importance of losing weight. In addition, several demographic factors were investigated as potential mediators/correlates of success, including socioeconomic status (measured by public assistance vs. private insurance and the Hollingshead Index of socioeconomic status [27]), age, ethnicity, initial BMI, and a measure of intellectual functioning (KBIT [28]).

Procedures

The initial 150 program participants (from July 2000 to September 2001) were invited to participate in the follow-up study. Contact was attempted with all 150 participants via mail and telephone to participate in the follow-up study. Children and their parents came during a scheduled appointment time to meet with a research assistant. After completing a consent form, children's heights and weights were measured. Families were given a \$50 money order to compensate them for their time and travel. If the children were still actively involved in the FitMatters Program, their heights and weights were collected during their weekly therapy sessions. The average time from initial assessment to follow-up was 23 months ($SD = 3.8$).

Statistical analyses were carried out using SPSS software (SPSS Inc., Chicago, Illinois). Analyses of variance (ANOVAs) were conducted to determine differences between groups of participants (based on level of weight change) on individual and family measures of behavioral and emotional stability, pretreatment weight control and exercise behaviors, process measures, and demographic variables. Discriminant function analyses were conducted with the same variables to discriminate between a Successful and a Less Successful group. Finally, correlation coefficients were computed to examine factors related to success.

Secondary analyses focused on comparing the rate of weight gain before and after participating in treatment, through use of a Comparison Group for whom medical record data were available before treatment. It was hypothesized that participants who met a clinically meaningful criterion for success would show improved weight change

compared with the Comparison Group (i.e., weight changes in the year before treatment).

Results

Of the 150 initial participants in the program, 94 were able to be reached, of whom 83 agreed to participate in the follow-up study. The remaining 56 were unable to be contacted because of disconnected telephones or a lack of forwarding mail address. Study participants did not differ significantly from nonparticipants at baseline (initial assessment) on demographic factors, initial weight measures, potential predictors, or the process measures of child and parental self-monitoring (Table 2). However, study participants attended significantly more treatment sessions than nonparticipants.

Overall weight change

Overall, the 83 participants lost weight (M BMI z -score change = $-.05$, $SD = 1.41$). To analyze factors that contributed to success, study participants were divided into a Successful group and a Less Successful group. Group determination was based on the degree of change in BMI z -scores. It has been found that modest weight loss among obese adults (a decrease of $\leq 10\%$) [29] produces beneficial health effects and that the heaviest patients could benefit the most from modest weight loss. It seems logical that morbidly obese children would show similar benefits from similar reductions in weight and BMI. In examining the frequency of change scores among participants (Figure 1), a natural cut point was apparent between those who lost $.70$ BMI z -points (corresponding to a 2.5% reduction in weight) and those who lost less weight or gained weight, delineating a possible "Successful" group. Half of those participants achieved a 5% weight loss or more (corresponding to a z change of ≥ 1.47); however, including only those with a z change of -1.47 or greater would have significantly limited the sample size and the statistical power of the analyses. It is also quite possible that a 2.5% weight loss in morbidly obese adolescents represents a clinically meaningful improvement [29]. Therefore, the naturally observed division of groups was used to delineate the "Successful" group (BMI z -score decrease of $.70$ or greater) and the "Less Successful" group (BMI z -score decrease of less than $.70$). These delineations indicate that 19 of 83 participants (23%) may have achieved clinically meaningful weight changes, including 9 of 83 (11%) who lost the equivalent of 5% or more of initial weight. The Successful participants weighed more at the assessment (M BMI z -score = 7.77 , $SD = 4.26$) than the Less Successful participants (M BMI z -score = 5.48 , $SD = 2.67$; $F(1, 81) = 8.02$, $p = .006$), and as would be expected from the

Table 2
Comparison of study participants versus nonparticipants

(M [SD]) unless otherwise indicated	(ANOVA unless otherwise indicated)
Demographic factors	
Gender (%)	
Male	$\chi^2 = 0.00, p = .99$
Ethnicity (%)	
African-American vs. Hispanic	$\chi^2 = 0.59, p = .44$
African-American vs. Other	$\chi^2 = 2.01, p = .16$
Hispanic vs. Other	$\chi^2 = 0.23, p = .63$
Family SES	$F(1, 199) = .42, p = .52$
Age in years	$F(1, 148) = .08, p = .77$
Intellectual functioning (K-BIT Standard Score)	$F(1, 64) = .16, p = .69$
Weight measures	
Weight in kg	$F(1, 120) = .05, p = .82$
Height in cm	$F(1, 51) = 1.04, p = .31$
Body Mass Index (kg/m ²)	$F(1, 138) = .02, p = .89$
BMI z-score	$F(1, 138) = .00, p = .99$
Potential predictors	
Child Behavior Checklist (T-scores)	
Somatic	$F(1, 113) = .02, p = .90$
Anxious/depressive	$F(1, 110) = 2.00, p = .16$
Aggressive	$F(1, 114) = .11, p = .74$
Youth Self-Report (T-scores)	
Somatic	$F(1, 91) = .30, p = .59$
Depressive	$F(1, 95) = .22, p = .64$
Aggressive	$F(1, 95) = 2.67, p = .11$
Conflict Behavior Questionnaire (percentile)	
Child rating mother	$F(1, 96) = 1.13, p = .29$
Child rating father	$F(1, 80) = 1.09, p = .30$
Mother rating child	$F(1, 108) = .01, p = .92$
Weight control habits (11 items, 5-point Likert scale)	$F(1, 110) = .01, p = .92$
Current exercise survey (calories in exercise during previous week)	$F(1, 120) = .72, p = .40$
Eating self-efficacy (25 items, 7-point Likert scale)	$F(1, 108) = .61, p = .44$
Binge-eating scale (9 items, 0–3 points)	$F(1, 106) = 3.27, p = .07$
Child's readiness to participate (7-point Likert scale)	$F(1, 119) = 2.62, p = .11$
Child's importance of losing weight (7-point Likert scale)	$F(1, 117) = .01, p = .94$
Process measures	
Consistency of self-monitoring	
Child (average days per week for first 3 months)	$F(1, 60) = .41, p = .52$
Parent (average days per week for first month)	$F(1, 80) = .81, p = .37$
Attendance	
Number of sessions attended	$F(1, 145) = 8.12, p = .005$

research-imposed group delineations, the Successful group lost significantly more weight (M BMI z-score change = -1.77 , SD = 1.48) than the Less Successful group (M BMI z-score change = $+0.46$, SD = .90; $F(1, 81) = 64.95, p < .0001$)

Predictors of success

Discriminant function analyses were conducted to identify predictors that discriminated between the Successful and the Less Successful groups. All assumptions regarding use of discriminant function analyses were met. Because quite a few participants failed to complete some of the assessment measures, the variables were grouped conceptually to maximize statistical power. Six separate discriminant function analyses were computed: Socioeconomic Status, Individual Factors (intellectual functioning, age), Individual Psychological Functioning (satisfaction with life, aggression, depression/anxiety, somatization), Family Factors (beliefs about family's influence, family interactions), Pretreatment Weight-Loss Behaviors (importance of losing weight, readiness to participate in the program, level of exercise, binge-eating behaviors, weight-control habits, eating self-efficacy), and Program Process Measures (number of sessions attended, average monthly attendance, consistency of attendance, level of self-monitoring for first three months of participation, level of parental self-monitoring).

Only Individual Factors significantly differentiated the two success groups ($\Lambda = .75, \chi^2(3, n = 31) = 8.03, p < .05$). In Table 3, the within-groups correlations between the Individual Factors predictors and the discriminant function as well as the standardized weights are presented, along with the classification matrix. Based on these coefficients, the Verbal IQ scores demonstrated the strongest relationship with the discriminant function; accordingly, the discriminant function was labeled Verbal Skills. The means on the discriminant function indicate that the Successful weight controllers had lower verbal skills (M = -1.15) than the Less Successful weight controllers (M = $.28$). Group membership was classified correctly for 77% of the individuals in the sample, $\kappa = .11$.

Correlates of success

To explore possible predictors of long-term success in more detail, correlation coefficients were computed between the change in BMI z-score from assessment to follow-up and the 31 variables (in the six domains) used in the discriminant function analyses. Using the Bonferroni approach to control for Type I error across the 31 correlations, which required a p value of less than .002 (.05/31) for significance, no correlations were significant. For exploratory purposes, it is useful nevertheless to examine relatively high correlations between the predictor variables and overall weight loss. The results of the correlational analyses showed that two of the 31 correlations were relatively high ($p < .05$) and were $\geq -.27$. In general, the results suggest that those adolescents with higher parent-observed anxiety/depression tended to show greater weight reductions from assessment to two years after initiating treatment. Additionally, those adolescents who attended more treatment ses-

year before treatment was .49 (which corresponds to a 1.76 increase in BMI points, or +4.5 kg for our average participant). In order to more directly compare the rate of weight change from assessment to follow-up (average number of months from assessment to follow-up was 23 months) with the year before treatment (12 months), the rate of weight change in the year before treatment was doubled, and a repeated measures analysis of variance (ANOVA) was conducted. Although participants gained weight in the prorated two years before treatment ($M z$ change = +.98) and lost weight from assessment to follow-up ($M z$ change = -.27), the difference in rates of weight change was not significant ($p = .271$).

Another analysis between the Comparison group and FitMatters participants concerns the proportion of participants who made progress over the follow-up period, as compared with the anticipated weight gain had they not participated in the program (based on the weight gain of the Comparison Group subset in the prior year). The median change for the Comparison group for the year before treatment was +.29 z -scores, or +.58 z -scores for the estimated two-year z -score change (to use comparable durations). Seventy-one percent (59/83) of FitMatters participants fared better than the Comparison Group's median score (50%), a significant difference, $z = 2.039$, $p < .021$.

Discussion

The comparisons between the Successful, Less Successful, and Comparison Group demonstrated the considerable range in long-term outcomes for the participants in FitMatters. Those 19 participants in the Successful group included nine who averaged the equivalent of 5% weight loss or more, and another 10 who lost the equivalent of between 2.5% and 5% of their initial weights. These outcomes are far better than the 4% or more weight gain projected from the data gathered the year before in the medical records for the Comparison Group. Perhaps these adolescents are now on their way to healthier and more satisfying lives. Nonetheless, only a few of them have left the ranks of the morbidly obese and the majority of participants in FitMatters still face major health and psychological challenges associated with their obesity. It is also important to acknowledge that the comparison group was a convenience sample, and they may not have represented the entire sample in treatment. The correlations were also based on a restricted sample, with the possibility of restriction in the range of the data. It should also be noted that the treatment program itself has been evolving, and the version of FitMatters several years after the present participants experienced it may prove more efficacious.

The assessment data and process measures were evaluated in an attempt to understand which participants benefited most from this multidisciplinary empirically based approach to weight control. Most of the predictors and

correlates were relatively weak, but some do point to potentially relevant factors. For example, Successful participants attended, on average, about 50% more sessions over close to one year compared with their Less Successful peers who attended far fewer sessions over six months. Attendance at such programs predicts weight loss better than any other factor [30,31]. In addition, Successful participants had somewhat better critical weight-control skills during the program, such as self-monitoring [18,32,33]. They also may have been somewhat more needy of help overall: Their higher initial weights fit this neediness explanation, due to the greater degree of social isolation and stigma associated with very high levels of obesity in children [7,8]. On the other hand, regression to the mean could also account for some of the improvements noted in the Successful group. Although the Less Successful group weighed less than the Successful group on average, 95% of the Less Successful participants nevertheless had BMIs at least two standard deviations above the overall mean.

The results of the secondary analyses supported the hypothesis that the Successful weight controllers lost more weight (average loss of 1.76 BMI z -scores) compared with what would be expected if they had not been in treatment (Comparison Group pretreatment gain of .98 z -scores). However, it was expected that those in treatment, even in the Less Successful group, would still have lost more weight compared with the year before treatment. This Less Successful group actually gained much more weight than the comparison group (+5.94 vs. +.98). It is possible that the significant differences between the prior year average and the Less Successful group were due in part to a sampling effect. The comparison group had received subspecialty medical services at La Rabida Children's Hospital in the year before treatment in FitMatters. Consequently, they may have been receiving more medical intervention regarding their weight and had more family involvement in addressing health issues than average participants. This attention from both medical professionals and parents may have helped stabilize their weights (although still in the morbidly obese range). Alternatively, the Less Successful participants' observed weight gain may have reflected their pretreatment pattern or perhaps they might have been gaining weight even more rapidly before treatment. Unfortunately, these alternative explanations remain untested because verifiable heights and weights from the year before treatment were not available for most participants.

The present outcomes are far less favorable than those achieved with less overweight and more affluent, primarily Caucasian groups of children and adolescents [34,35]. This is consistent with Kumanyika's [10] observations about the relative ineffectiveness of most interventions with low-income minority participants and with findings showing worse nutritional management, more instability, and more accepting attitudes toward obesity in such communities [11–13]. It may take far more aggressive interventions to

produce dramatically favorable outcomes for most morbidly obese adolescents from low-income minority communities. Although surgical interventions have not been as effective in low-income minority populations as compared with more middle-class, Caucasian populations, surgery does produce clinically substantial change for some low-income individuals. Only a few participants in the present program were successful to that degree. Therefore, it seems worth exploring the impact of bariatric surgery with this morbidly obese low-income population. Long-term participation in some type of residential treatment setting (e.g., a therapeutic high school) [36,37] or related approaches also seem warranted. Perhaps some version of FitMatters with enhanced contact (e.g., Internet communication daily) [38], frequent home visits, and frequent structured exercise and cooking/eating sessions could help [39].

As the first long-term evaluation undertaken with this very high risk group of adolescents, an important step has been taken; yet people spend billions trying to develop the requisite healthy obsession [37,40] to produce lifelong weight control. Unfortunately, that healthy obsession may be even less accessible when the obese victims are very young people who have fewer resources, less acceptance in society, and less educated and supportive environments than their more affluent counterparts.

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