Managing Atypical Antipsychotic–Associated Weight Gain: 12-Month Data on a Multimodal Weight Control Program

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Background: The purpose of this study was to test prospectively the feasibility and efficacy of a multimodal weight control program for overweight and obese severely mentally ill adults who had gained weight while taking atypical antipsychotic medications.

Method: Thirty-one subjects with schizophrenia or schizoaffective disorder (DSM-IV), on treatment with atypical antipsychotics, participated in a 52-week, multimodal weight control program that incorporated nutrition, exercise, and behavioral interventions. The primary outcomes were measures of body mass index (BMI) and weight. A variety of secondary outcomes, including hemoglobin A_{1c} level, systolic and diastolic blood pressure, and cholesterol level, were compared from baseline to endpoint. Weight and BMI changes in the intervention group were also compared with changes in 20 nonintervention patients ("usual care" group) who were contemporaneously treated in the same clinics.

Results: Twenty of the 31 subjects in the intervention group completed the program. Statistically significant pre-post improvements in weight ($p < .02$), BMI ($p < .02$), hemoglobin A_{1c} levels ($p < .001$), diastolic ($p < .001$) and systolic ($p < .05$) blood pressure, exercise level ($p < .003$), nutrition knowledge ($p < .0001$), and stage of change (exercise [$p < .0001$] and weight [$p < .008$]) were seen in the intervention group. Patients attended a mean of 69% of the sessions during the year of the program. Weight and BMI also decreased significantly ($p = .01$) in the intervention group compared with the "usual care" group, who gained weight during the observation period.

Conclusions: Individuals with schizophrenia and schizoaffective disorder were willing to attend, and benefited from, a weight control program that focused on nutrition, exercise, and motivation. The program resulted in clinically significant reductions in weight, BMI, and other risk factors for long-term poor health, including hemoglobin A_{1c}. In contrast, patients who did not receive the weight control intervention continued to gain weight.

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Patients with schizophrenia are, on average, significantly overweight.[1,2] Because of this, these patients are at increased risk for a variety of obesity-related medical conditions such as diabetes[3,4] and cardiovascular disease.[5,6] Furthermore, patients with schizophrenia are 2 to 4 times more likely to die prematurely, and their life span is shortened by 10 years compared with nonschizophrenics.[7,8] Excess weight and obesity are also related to a variety of other poor distal outcomes, such as social stigma, noncompliance, and relapse.[9,10]

A variety of factors contribute to obesity in schizophrenia, including lifestyle factors such as poor diet and lack of exercise.[11] In addition, some of the excess weight seen in schizophrenics is medication-induced, as weight gain has been well documented for both conventional antipsychotics and the newer atypical antipsychotics.[12–14] While atypical antipsychotics are associated with superior tolerability,[15,16] better compliance,[9] and improved relapse prevention,[17] the weight gain associated with some of these drugs and the dangers of excess weight have received considerable attention.

In nonschizophrenic populations, weight loss in overweight and obese individuals can effectively reduce the risk of associated complications, including diabetes and cardiovascular disease.[18–20] In addition, weight loss reduces serum triglyceride levels, total serum cholesterol levels, and low-density lipoprotein (LDL) cholesterol

levels and increases high-density lipoprotein (HDL) cholesterol levels.[20]

Despite the risks associated with excess weight, and the benefits of weight loss, little attention has been paid to methods of weight reduction in patients with schizophrenia. The illness is frequently accompanied by deficits in attention, motivation, and memory[21] that could directly impact the ability of these patients to benefit from weight reduction programs that are recommended for other patient populations. Nonetheless, patients with schizophrenia can make significant gains in learning and skills with programs designed to compensate for cognitive impairments.[22,23]

There are some preliminary data, including 3 small studies of inpatients, that suggest that weight control methods may be of benefit to patients with schizophrenia. In a retrospective study of 32 patients with schizophrenia in a residential care facility, Aquila and Emanuel[24] suggested that weight was controlled (mean loss of 1.3 lb over 1 year) by a combination of diet, nutrition, and education. Further evidence from an older inpatient study, in which the author was able to restrict food intake, found weight loss with diet alone.[25] Rotatori et al.[26] also reported some weight loss in 7 psychiatric inpatients who were treated with behavioral therapy.

There are also some preliminary data in psychiatric outpatients suggesting the usefulness of weight control programs. In a retrospective analysis of male schizophrenics in an outpatient clinic, Wirshing et al.[27] reported on a stepwise approach used for patients who continued to gain weight despite feedback on their weight and diet. Patients were referred to a "Wellness Clinic," which involved a rigorous evaluation of both exercise and dietary habits. Additionally, education, exercise, and group support were added if the initial referral was not successful. The authors reported some moderation of weight gain, except among those patients taking clozapine, with these strategies. Ball et al.[28] reported on 11 patients with schizophrenia and olanzapine-related weight gain who completed a Weight Watchers and exercise program. While there was no statistically significant difference in weight change between these 11 individuals and a comparison no-treatment group, the authors found that men in the program did lose weight. The 7 men in the study lost a mean of 7.31 lb, suggesting that there may be value in this approach. Lastly, preliminary findings from a small pilot program of 6 schizophrenic outpatients that included a weekly 1-hour modular program on nutrition and exercise over 4 months suggested that this intervention may prevent or limit atypical antipsychotic–induced weight gain.[29]

Overall, then, weight control is not well studied in schizophrenia, and there are few data to guide clinical practice. The purpose of the present study was to prospectively test the feasibility and efficacy of a weight control program designed for overweight and obese severely mentally ill outpatient adults who had gained weight while taking atypical antipsychotic medications. The study was designed to assist these individuals in making long-lasting lifestyle and behavioral changes that would affect weight loss and overall health. We hypothesized that subjects who were involved in a structured weight control program would comply with the program and would lose more weight than patients who received psychiatric care as usual. In addition, we examined a variety of health-related secondary outcomes in the intervention group.

METHOD

Subjects

Thirty-one subjects with serious and persistent mental illness from 2 day-treatment programs were approached and agreed to enroll in a 12-month, multimodal, weight control program ("Healthy Living"). Twenty of the patients had schizophrenia, and 11 had schizoaffective disorder. Sixteen subjects who were approached declined to participate. Institutional review board approval was obtained for this study, and subjects signed informed consent statements prior to enrollment. All patients had been treated with an atypical antipsychotic medication for a minimum of 3 months and had a BMI of 26 or greater or a self-reported weight gain of 2.3 kg (5.0 lb) or more within 2 months of beginning treatment with an atypical agent.

Prior to enrollment, subjects underwent a screening evaluation, including a psychiatric clinical interview, a physical examination, screening laboratory tests, a comprehensive nutrition assessment, and motivational assessment. The study took place at 2 day-treatment sites at a community mental health center. The subjects who enrolled in the study had been attending one of the day-treatment programs for their routine psychiatric care between 2 and 5 days per week. An advanced practice nurse, 2 registered nurses, and a registered dietitian administered the program at the 2 sites.

A review of charts from the same 2 sites revealed 20 patients on treatment with atypical antipsychotics who had weight and height recorded for the same historical period during which the intervention was carried out. These patients were designated as the "usual care" group.

Outcome Measures

The primary outcome measures included weight and BMI in the intervention group. Secondary outcomes included hemoglobin A_{1c} levels (HbA_{1c}), cholesterol levels, (including HDL, LDL, and VLDL), triglyceride levels, compliance (attendance), blood pressure (diastolic and systolic), pulse rate, hip and waist measurements, hunger, stages of change (for exercise and weight), change in nutrition knowledge, and change in amount of exercise. For the rating of hunger, subjects were asked to rate how hungry

they were over the past 7 days on a 5-point Likert scale where a score of 5 indicates greatest level of hunger. The exercise measure was a self-report of the total minutes exercised per week. The nutrition knowledge assessment (unpublished; available from the authors on request) consisted of 16 multiple-choice questions on nutrition topics taught in the program. The range of possible scores was 1 to 16, with 16 indicating the highest level of nutrition knowledge. Stages of change were assessed for weight and exercise. For stages of change, subjects were asked to rate (on a 1–6 scale where 6 indicates greatest readiness to change) how ready they were to do something about their behavior and how they felt about losing weight and exercising. Prochaska and colleagues' model[30] was then utilized to assign stage of readiness to change for weight and exercise.

Weight and BMI data were also collected during the same 12-month period for patients in the comparison "usual care" group.

Intervention

The Healthy Living program incorporated nutrition counseling, exercise, and behavioral interventions designed to help adults with schizophrenia implement healthy lifestyle changes.[31] Behavioral strategies included self-monitoring of eating and physical activity, stress management, stimulus control, problem solving, and social support. Motivational counseling techniques[32] were also utilized throughout the study. Although personal responsibility for lifestyle change was emphasized, professional support, encouragement, and expertise to assist the subjects in this endeavor were provided.

Subjects were involved directly in the process of brainstorming and evaluating possible strategies to improve eating and exercise habits. After a list of options was developed, the subjects were encouraged to choose those that they thought were most likely to be successful. They were also given a great deal of positive feedback whenever constructive change was noted. Techniques aimed at enhancing subjects' confidence in their ability to cope with obstacles and succeed in change were employed. Special teaching approaches for people with cognitive deficits, such as repetition, homework, and the use of visual materials, were also used throughout the program.

The intervention lasted for 12 months and consisted of 4 phases: (1) an assessment phase; (2) an intensive 12-week weight control program with group meetings twice per week and one 15-minute individual session per week; (3) a 12-week, step-down, less intensive weight control program with a group meeting once per week and one 15-minute individual session per month; and (4) a 6-month weight-maintenance extension program with a group meeting once per week and one 15-minute individual session per month.

One of the 2 weekly group sessions in the intensive phase included teaching of basic nutrition principles. Topics included healthful weight management techniques, meal planning, label reading, food shopping and preparation, portion size, and healthy snacking. Actual food models, and in some cases, the real foods were used to experiment with and identify portion sizes. As part of their homework assignments, subjects were urged to keep a food diary. The other weekly group session in the intensive phase focused on behavioral management techniques and principles of physical fitness. Benefits and principles of physical fitness were taught, including how to measure and monitor target heart rate. Subjects were educated about a wide range of behavioral techniques that included developing slower eating habits and differentiating emotional hunger from physiological hunger.

Subjects were encouraged to engage in light-to-moderate exercise (at least as intense as sustained walking) for a minimum of 20 minutes 3 to 5 times per week. To help subjects increase their exercise level, 2 opportunities per week to participate in an aerobic walking activity were incorporated into the group sessions. Exercise consisted of intense, sustained walking or participation in an aerobic walking video class. Additionally, subjects were encouraged to exercise on their own at least 1 additional time per week.

Weekly weight changes and treatment goals were discussed during the individual appointment. The individual session focused on plans to assist subjects to attain their desirable weight by making healthier food choices, increasing physical activity, and learning more effective coping strategies.

Further detail on the methods and the sample can be found in a previous report that focused on the 3-month intensive phase results of this program.[33]

Analysis Within the Intervention Group

Data on weight, BMI, HbA_{1c}, cholesterol, triglycerides, systolic and diastolic blood pressure, waist and hip measurements, hunger level, amount of exercise, pulse, nutrition knowledge, and stage of readiness to change weight and exercise were analyzed from baseline to endpoint for the intervention group using a 2-tailed paired t test (SAS, proc univariate; SAS Institute, Cary, N.C.). Attendance (compliance) was tabulated for each visit and reported as mean percent attendance. In addition, the changes in BMI and weight were analyzed separately for those who completed the intervention versus those who did not complete the intervention.

The data from the last observation for each individual were carried forward to endpoint for all analyses. All analyses were performed using SAS software.

Analysis Between Groups

Weight and BMI were analyzed for treatment effect between the intervention and nonintervention groups using analysis of covariance (ANCOVA) with baseline BMI,

age, and gender as covariates. The data from the last observation for each individual were carried forward to endpoint for this analysis, which was performed using SAS software.

RESULTS

Table 1 lists the main demographic and drug variables for both groups.

Weight and BMI

Table 2 details the changes in BMI and weight seen in those who completed the intervention and those who did not complete the intervention, as well as for the group as a whole. In the treatment group, there was a mean weight loss of 6.6 lb (3.0 kg; 3.0% of body weight) over the 12 months of the study, and this change was significant ($t = 2.67$, $p < .02$). In these patients, BMI decreased by 1.74 (5.1%), which was also statistically significant ($t = 2.59$, $p < .02$).

Table 3 lists the BMI, weight, and compliance results for both groups. Both groups were obese with a mean BMI at baseline of 34.3 in the treatment group and 32.2 in the nonintervention group. As noted above, there was a mean weight loss of 6.6 lb (3.0 kg) in the intervention group and a mean gain of 7.0 lb (3.2 kg; 3.5% of body weight) in the nonintervention group. This difference was statistically significant: $F = 6.67$, $df = 1,43$; $p = .01$. The corresponding change in the BMI was a decrease of 1.7 (5.1%) in the intervention group and an increase of 2.6 (8.1%) in the nonintervention group. This difference was also statistically significant: $F = 8.65$, $df = 1,43$; $p = .01$. Figure 1 shows these changes over time.

Secondary Outcomes

Table 4 lists secondary outcome variables. Within the intervention group, statistically significant improvements were seen in HbA_{1c}, systolic and diastolic blood pressure, waist and hip measurements, minutes per week of exercise, nutrition knowledge, and the stage of change for exercise and weight. There were no statistically significant changes in cholesterol (including LDL, HDL, and VLDL), hunger rating, or pulse rate. Nutritional knowledge increased from a mean score of 7.8 at baseline to 11.2 at endpoint.

Attendance

Eighty-seven percent of the subjects completed the intensive 12-week program. Sixty-five percent of the subjects completed the entire 12 months of the program. The mean attendance throughout the study was 69% and ranged from 9% to 96%. A median split was performed on attendance, and this grouping was used as stratification (high and low) for an analysis of BMI changes. Those in the high-attendance group (75% attendance and above) showed significantly reduced baseline to endpoint BMI ($t = 2.17$, $df = 14$, $p = .04$) in comparison to the low attenders, who did not ($p = NS$).

Table 1. Demographic Characteristics and Medication in Antipsychotic-Treated Patients Participating in a Weight Control Program and Those Receiving Usual Care

	Group	
Characteristic	Intervention (N = 31)	Usual Care (N = 20)
Gender, N (%)		
Male	19 (61.3)	10 (50.0)
Female	12 (38.7)	10 (50.0)
Age, mean, y	42.6	47.2
Employment, N		
Unemployed	27	NA
Part-time	1	NA
Full-time	1	NA
Retired	2	NA
Antipsychotic, N (%)		
Clozapine	6 (19.4)	3 (15.0)
Olanzapine	14 (45.2)	9 (45.0)
Risperidone	9 (29.0)	8 (40.0)
Quetiapine	2 (6.5)	0 (0.0)

Abbreviation: NA = not available.

Effect of Particular Atypical Drug

At baseline, 14 patients were taking olanzapine; 9, risperidone; 6, clozapine; and 2, quetiapine. Weight and BMI were analyzed for treatment effect from baseline to endpoint with drug type as the independent variable of interest, using ANCOVA with baseline BMI, age, and gender as covariates. While the power to detect differences was low due to the small sample size, there were no detected differences between drugs.

DISCUSSION

These are the first long-term, prospective data on weight management in outpatients with serious and persistent mental illness and atypical antipsychotic–associated weight gain. The results suggest that these patients are able to adhere to, and benefit from, an intensive weight control program. Patients enrolled in the Healthy Living program lost significant amounts of weight from baseline to endpoint and also significantly reduced their BMI. There were also significant improvements in a variety of secondary outcomes, including systolic and diastolic blood pressure and HbA_{1c}.

The data on the Healthy Living patients were also compared with those of a contemporaneous, nonrandomized group receiving atypical antipsychotics in our clinic. While the Healthy Living patients lost weight, the usual care patients continued to gain weight.

In the intervention group, there was a mean weight loss of 6.6 lb (3.0 kg), and in the nonintervention group, there was a mean gain of 7.0 lb (3.2 kg). A weight loss of 6.6 lb (3.0 kg) over 1 year may not seem great at first, but it is

Table 2. Analysis of Pre-Post Body Mass Index (BMI) and Weight by Completion or Noncompletion of a Weight Control Program for Antipsychotic-Treated Patients

	Intervention Group (N = 31)			Completers (N = 20)			Noncompleters (N = 11)		
Measure	Mean (SD)	t[a]	p	Mean (SD)	t[a]	p	Mean (SD)	t[a]	p
BMI									
Baseline	34.3 (6.3)	2.59	< .02	33.9 (6.4)	–2.43	< .05	35.2 (6.4)	–0.62	NS
Endpoint	32.6 (5.5)			32.5 (6.4)			34.9 (5.4)		
Weight, lb									
Baseline	220.9 (43.5)	2.67	< .02	220.4 (45.6)	–2.52	< .05	221.9 (41.0)	–0.61	NS
Endpoint	214.3 (41.3)			212.1 (44.3)			220.0 (34.7)		

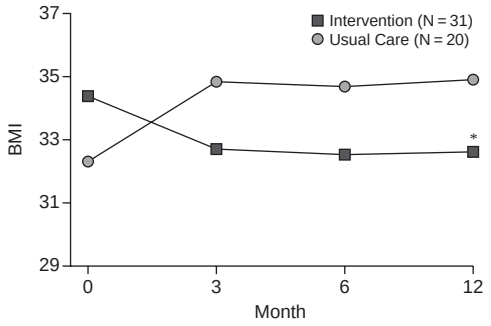
[a]Paired t test.
Abbreviation: NS = not significant.

Table 3. Weight, Body Mass Index (BMI), and Compliance in Antipsychotic-Treated Patients Participating in a Weight Control Program and Those Receiving Usual Care

	Group	
Measure	Intervention (N = 31)	Usual Care (N = 20)
BMI		
Baseline	34.3	32.2
6 mo	32.5	34.6
Endpoint	32.6	34.8
Change[a]	–1.7	2.6
Change in BMI, %	–5.1	8.1
Weight, lb		
Baseline	220.9	192.8
6 mo	214.4	199.2
Endpoint	214.3	199.8
Change[b]	–6.6	7.0
Change in weight, %	–3.0	3.5
Patients who completed the program, %		
12-Week intensive phase	87	…
12-Month trial	65	…

[a]F = 8.65, p = .01.
[b]F = 6.67, p = .01.

Figure 1. Change in Body Mass Index (BMI) in Antipsychotic-Treated Patients Participating in a 1-Year Weight Control Program Versus Those Receiving Usual Care



*p = .005 vs. usual care.

actually very clinically significant, as Fontaine et al.[34] estimated that in overweight patients a change in weight of 5.5 lb (2.5 kg) would be expected to result in an additional 257 to 258 deaths per 100,000 people over 10 years. Similarly, a weight gain of 5.5 lb (2.5 kg) would be expected to result in many additional cases of impaired glucose tolerance and hypertension over 10 years. To further place this change in perspective, the Institute of Medicine has suggested that weight losses of as little as 5% in obese individuals can result in clinically meaningful reductions in morbidity and risk of early mortality.[35] When the 6.5% difference between groups at endpoint (a decrease of 3.0% in the intervention group and an increase of 3.5% in the usual care group) is taken into consideration, it is clear that the changes seen in this study are clinically important.

We believe that these results must also be considered in the context of other weight loss options for these patients, which, unfortunately, are limited. Pharmacologic approaches have been disappointing, with numerous case reports describing a worsening of psychosis with use of centrally acting weight loss drugs.[36] The problem of obesity-related health risks in schizophrenia is significant, and we believe that, at present, nonpharmacologic approaches offer the best potential for intervention.

The changes that were seen in the intervention group in HbA_{1c}, blood pressure, waist and hip measurement, exercise, nutrition knowledge, and readiness to change are also encouraging. Diastolic and systolic blood pressure, as well as waist measurement and HbA_{1c}, are independent risk factors for cardiovascular disease.[20,37] Therefore, the significant reductions in these outcomes that were found in this study have direct health implications. The improvements in exercise, nutrition knowledge, and readiness to change are important factors in potentially maintaining a healthy lifestyle. While this study was not designed to address these long-term issues, the results suggest that these interventions should be explored in long-term studies.

The design of the Healthy Living program was based on, among others, the Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults developed by the National Heart, Lung, and Blood Institute.[20,38,39] Recommended treatment strategies for weight loss and weight maintenance include

Table 4. Secondary Outcome Measures in Antipsychotic-Treated Patients Participating in a Weight Control Program

Measure	Baseline, Mean	Endpoint, Mean	t	p
Hemoglobin A_{1c}, %	5.35	5.11	3.75	.001
Systolic BP, mm Hg	124.1	120.4	2.03	< .05
Diastolic BP, mm Hg	79.8	74.2	3.71	.001
Exercise per week, min	53	124	3.21	.003
Waist, in	44.4	43.3	3.03	.005
Hip, in	47.5	45.9	3.6	.001
Nutrition knowledge[a]	7.8	11.2	5.1	.0001
Exercise stage[b]	4.13	5.48	5.6	.0001
Weight stage[c]	4.19	5.24	3.8	.008
Cholesterol, mg/dL				
Total	208	208	NS	
LDL	128	124	NS	
HDL	42.2	45.1	NS	
VLDL	36.8	37.15	NS	
Triglycerides, mg/dL	176.2	191.3	NS	
Hunger rating[d]	3.7	3.5	NS	
Pulse	82	84	NS	

[a]Assessment consisted of 16 questions on nutrition topics; highest possible score (indicating the highest level of nutrition knowledge) was 16.
[b]Subjects rated (on a 1–6 scale where 6 = greatest readiness to change) how ready they were to change their behavior and how they felt about exercising.
[c]Subjects rated (on a 1–6 scale where 6 = greatest readiness to change) how ready they were to change their behavior and how they felt about losing weight.
[d]Subjects rated (on a 5-point Likert scale where 5 = greatest hunger) how hungry they were over the past 7 days.
Abbreviations: BP = blood pressure, HDL = high-density lipoprotein, LDL = low-density lipoprotein, NS = not significant, VLDL = very-low-density lipoprotein.

modifications in diet, behavior, and physical activity. According to these guidelines, combined therapy incorporating all 3 approaches is the most successful strategy for achieving weight loss and weight management. We also attempted to take into account the cognitive difficulties found in patients with schizophrenia by emphasizing special teaching approaches, such as repetition, homework, and the use of visual materials. These issues should be examined more closely, however, in future studies.

There has been considerable debate on the relative risk of weight gain attributable to various atypical antipsychotics. In this study, patients treated with all of the atypicals, including clozapine, lost weight, and there were no significant differences between the drugs in this respect. However, this analysis was severely limited by the small number of subjects and thus had little power to detect differences between drugs. We would draw no conclusions from this study on whether the atypical antipsychotic that patients take affects the weight loss they achieve with this program. A true test of this hypothesis would require a considerably larger study.

While the results of this trial are very encouraging, there are methodological aspects of the study that may limit the confidence in our results, as well as their generalizability. Subjects were not randomly assigned to the intervention or usual care group, and it is possible that there was a selection bias in favor of those patients who were motivated and interested in weight loss. However, as can be seen in Table 2, those who completed the intervention significantly reduced their weight and BMI, while those who did not complete the intervention did not lose weight. This finding would tend to argue for a specific treatment effect.

While all subjects in both groups had been on treatment with atypical agents for a minimum of 3 months (some had been taking the medications for a year or longer), it was not always possible to keep the dose constant throughout the study. It is possible that there was a differential increase in dosing in one of the groups. Furthermore, the potential effect of other medications on weight gain was not assessed in this study. Several patients were taking additional psychotropic agents that affect weight. These issues are difficult to control for in a treatment setting and constitute limitations to this study. Only a randomized trial can control for all of these nonspecific effects and allow firm conclusion about the efficacy of the intervention.

As can be seen in Figure 1, the change in weight occurred over the first 3 months of this study during the intensive phase when patients were being seen 3 times per week and had contact with a variety of professionals. Whether this intensive work is cost-effective is unclear. However, given the previously cited estimates of Fontaine et al.,[34] this amount of weight loss would save numerous lives over 10 years if applied to a large population.

Another potential limitation of this study is that an aggressive intervention like the Healthy Living program would be difficult to replicate in a private psychiatric office or in an outpatient program where patients are seen once a month for a medication management appointment. However, it could be replicated in other settings such as day hospital programs, long-term acute care settings, some outpatient community mental health facilities, and perhaps in some managed care organizations. The attendance data suggest that adherence to the program was not a limiting problem for these patients and this type of program. Further research should examine whether the program could be scaled back for use in other, less intensive outpatient settings.

CONCLUSIONS

This study suggests that a multimodal weight program, such as Healthy Living, is accepted by patients with serious and persistent mental illness and that they are able to lose weight and maintain the loss over a 1-year period. Furthermore, it appears that this weight loss is accompanied by improvements in other important health outcomes such as HbA_{1c}, systolic and diastolic blood pressure, exercise, and nutritional knowledge. A larger randomized trial that examines a variety of issues, including cost-effectiveness, is warranted.

We also believe that the study suggests that appropriate attention to health risk factors, including weight, in this population is important. Weight control interventions may improve the quality of life for patients with schizophrenia and decrease their risk of morbidity and mortality from weight-related disorders. It would be prudent for clinicians to monitor patients with increased risk for weight gain very closely and to engage them in programs that emphasize a healthy lifestyle.

Drug names: clozapine (Clozaril and others), olanzapine (Zyprexa), quetiapine (Seroquel), risperidone (Risperdal).

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