

Factors Associated with Attrition in Weight Loss Programs

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Abstract

Attrition in weight loss programs is a complex process, influenced by patients' pretreatment characteristics and treatment variables, but available data are contradictory. Only a few variables have been confirmed by more than one study as relevant risk factors, but recently new data of clinical utility emerged from "real world" large observational studies. Practical difficulties, unsatisfactory results, a few psychological variables (e.g. lack of motivation, unrealistic weight loss expectations, overall level of stress, self-confidence in the ability to lose additional weight without professional help, and sense of abandonment from therapists), seem to play a crucial role in the patients' decision of interrupting the weight loss treatment.

Keywords: obesity, behavior treatment, dropout, weight loss.

Attrition is one of the major causes of treatment failure in the field of obesity. In obesity trials, attrition rates range from 10 to 80% (Farley, Wade, & Birchmore, 2003), and vary according to the experimental design (randomized vs. observational study), and the type of treatment (drugs, behavior, bariatric surgery). Adherence to weight loss programs is a key component of long-term success (Dalle Grave, Melchionda, et al., 2005; Perri, Sears, & Clark, 1993), and therefore strategies are needed to reduce the dropout rates. These strategies can only rely on precise identification of factors leading to premature program termination (Grossi, et al., 2006).

Unfortunately, many studies on weight loss treatment do not report data on attrition or incompletely describe them. The reasons for this attitude probably come from the view of attrition as an index of poor treatment quality (Wadden & Letizia, 1992). Most of available studies measured attrition in research settings and used different exclusion criteria, such as diabetes (Bennett & Jones, 1986), heart disease, or the use of antidepressant medication (Ho, Nichaman, Taylor, Lee, & Foreyt, 1995). These restrictions limit the usefulness of these reports for a general understanding of the process of attrition in the "real world" of weight loss clinics. Very few studies evaluated attrition in typical clinical settings (Honas, Early, Frederickson, & O'Brien, 2003; Inelmen, et al., 2005; Melchionda, Besteghi, et al., 2003). In this area, the largest report is the QUOVADIS study (Quality of life in Obesity: eVALuation and DIsease Surveillance) (Melchionda, Marchesini, et al., 2003), an observational study on quality of life in 1,891 treatment-seeking obese patients. It extensively evaluated the factors associated with attrition in the "real world" setting of 25 medical centers accredited by the Italian Health Service for the treatment of obesity (Dalle Grave, Calugi, et al., 2005; Dalle Grave, Melchionda, et al., 2005; Grossi, et al., 2006). In the QUOVADIS study attrition rate was as high as 57% at 12 month (Dalle Grave, Calugi, et al., 2005) and 81.5% after a median observation period of 41 months (Grossi, et al., 2006). The study examined both the patients' pretreatment characteristics and the reason for attrition as reported by patients during a structured telephone interview.

In this review we shall revise data on the variables associated with attrition in adult weight loss programs dividing them in two main categories: 1) patients' pretreatment variables, and 2) treatment variables (Table 1). We reviewed data from published studies examining attrition in research and clinical settings, with a particular emphasis on the data from the QUOVADIS study.

Patients' pretreatment variables associated with attrition**Table 1**

Causes of attrition in weight loss programs of obesity

Patients' pretreatment variables

- A) Demographic variables
 - a. Age
 - b. Age at onset of obesity
 - c. Female gender
 - d. Full-time job
- B) Anthropometric variables
 - a. Body Mass Index
- C) Dieting and other behavioral variables
 - a. Lower age at first dieting
 - b. Higher level of dietary restraint
 - c. Dietary habits
 - d. Smoking and sedentary habits
- D) Psychological variables
 - a. High weight-loss expectations
 - b. Lack of motivation
 - c. Binge eating
 - d. Depression and stress
- E) Medical variables and quality of life

Treatment variables

- A) Practical difficulties
- B) Unsatisfactory results
- C) Type and setting of treatment
- Miscellaneous reasons

Demographic variables

Age and age of onset of obesity do not consistently predict attrition in research weight loss programs (Inelmen, et al., 2005; Perri, McAdoo, Spevak, & Newlin, 1984; Teixeira, et al., 2004). However, both the QUOVADIS study (Dalle Grave, Calugi, et al., 2005; Dalle Grave, Melchionda, et al., 2005)(Table 2) and another large observational study (Honas, et al., 2003) found that younger age was one the most important predictors of dropout. Female sex, divorce, and African-American race were associated with greater attrition rates in one study (Honas, et al., 2003), but these results were not systematically confirmed by others (Dalle Grave, Calugi, et al., 2005). Finally, one study found that full-time job was an independent factor associated with dropout (Inelmen, et al., 2005).

Table 2

Univariate analysis of pre-treatment factors associated with 3-year dropout in the QUOVADIS population (Dalle Grave, Melchionda, et al., 2005).

Data are presented as odds ratio (OR) and 95% confidence interval (CI).

	OR	95% CI	P value*
<i>Demographic Variables</i>			
Age (years /10)	0.79	0.72 – 0.86	< 0.001
Male gender	1.21	0.97 – 1.52	0.097
BMI (kg/m ² /5)	1.00	0.93 – 1.08	0.982
<i>Historical Variables</i>			
BMI at age 20 (kg/m ² /5)	1.09	0.99 – 1.19	0.074
Age at first dieting (years /10)	0.88	0.81 – 0.97	0.008
Maximum weight loss in previous dieting (%/10)	1.08	0.97 – 1.21	0.173
<i>Weight Loss Expectations</i>			
Maximum Acceptable BMI (kg/m ² /5)	0.91	0.82 – 1.02	0.120
Dream BMI (kg/m ² /5)	0.78	0.67 – 0.90	< 0.001
Expected One-Year BMI Loss (kg/m ² /5)	1.05	1.02 – 1.07	< 0.001
<i>Psychological variables</i>			
Symptom CheckList 90 (Total score > 1)	0.98	0.80 – 1.20	0.850
Symptom CheckList 90 (Depression score > 1)	1.25	0.92 – 1.71	0.151
Binge Eating Scale (Score > 16)	1.18	0.87 – 1.61	0.296

Note that the probability of dropout increases systematically with increasing weight loss expectations and with lower dream BMI. Younger age and younger age at first dieting were also associated with dropout.

Anthropometric variables

A 1992 review pointed out that neither initial weight, nor body fat or percentage of overweight consistently predicted attrition in subjects entering weight loss programs both with low or very low calorie diets (Wadden & Letizia, 1992). Subsequent studies found conflicting results. Two studies found no association between body mass index (BMI – kg/m²) and attrition (Dalle Grave, Melchionda, et al., 2005; Honas, et al., 2003), one study found a lower BMI in subjects who did not complete their weight-reducing programs (Inelmen, et al., 2005), and two studies a lower BMI in completers (Clark, Guise, & Niaura, 1995; Teixeira, et al., 2004).

Similarly, the analysis of body fat distribution produced conflicting results. One study observed a higher waist-to-hip ratio in noncompleters (Teixeira, et al., 2004); a second study showed a higher waist circumference in completers (Inelmen, et al., 2005).

Dieting and other behavioral variables

A younger age at first dieting (Dalle Grave, Melchionda, et al., 2005)(Table 2) and a higher number of previous weight loss attempts (Teixeira, et al., 2004; Yass-Reed, Barry, & Dacey, 1993) are independently associated with attrition. One study found that a low susceptibility to hunger, measured by

high level of dietary restraint at the Eating Inventory (Stunkard & Messick, 1983), were more likely to complete treatment (LaPorte & Stunkard, 1990), but this association was not confirmed (Wadden & Letizia, 1992).

Also dietary habits may play a role in the process of attrition. Dropouts are characterized by a significantly lower daily consumption of fresh fruit, a higher alcohol consumption at meal time (Inelmen, et al., 2005) and lower total energy, carbohydrate, and fiber intake at baseline (Teixeira, et al., 2004). Higher attrition rates are also reported in smoking and sedentary patients (Clark, Niaura, King, & Pera, 1996).

Psychological Variables

The roles of patients' psychological variables in attrition have been extensively investigated. Negative effects were reported for weight loss expectations, lack of motivation, binge eating, depression and life stress.

Weight Loss Expectations

A few studies suggested that having higher initial weight loss expectations is associated with higher dropout rate (Teixeira, et al., 2002; Teixeira, et al., 2004), whereas one study failed to associate goal and dream BMI with attendance to sessions of behavioral therapy (Linde, Jeffery, Finch, Ng, & Rothman, 2004). The QUOVADIS study widely evaluated the role of weight loss expectations and of other primary weight loss goals on attrition (Table 2). At baseline, the large group of obese Italian patients reported a mean dream BMI corresponding to a 32% weight loss, and a maximum acceptable BMI corresponding to a 23% weight loss (Dalle Grave, et al., 2004). After 12 months 51.7% of patients had interrupted their treatment program. The strongest predictors of attrition were lower age, and higher expected one-year BMI loss. Attrition was also higher in subjects with a primary motivation for weight loss based on appearance. The risk of drop-out increased systematically for unit increase in expected BMI loss at 12 months, and was particularly elevated in the first 6 months (Dalle Grave, Calugi, et al., 2005). After 36 months, only 15.7% of patients were in active treatment in the 15 medical centers that applied a continuous care model of treatment (Dalle Grave, Melchionda, et al., 2005). Again, the strongest predictors for continuous care were lower expected 1-year BMI loss and older age. The study adds two original observations to the area of obesity treatment outcome: 1) time to drop-out is progressively shorter in relation to expected BMI loss; 2) attrition is influenced also by goals other than weight loss, such as the primary motivation for weight loss based on appearance.

Lack of Motivation

Andersson and Rössner (Andersson & Rossner, 1997) were the first to show that drop-out might stem from decreased motivation, and lack of motivation was the leading cause of premature withdrawal in another study (Lantz, Peltonen, Agren, & Torgerson, 2003). In the QUOVADIS study, 12% of dropout patients retrospectively reported that lack of motivation was a leading cause of attrition (Grossi, et al., 2006)(Table 3).

Binge Eating

Greater attrition rates among obese binge eaters compared with nonbingers were initially reported (Marcus, Wing, & Hopkins, 1988; Wadden, Foster, & Letizia, 1992), but these results have been challenged. A few studies confirmed the association of binge eating with attrition (Sherwood, Jeffery, &

Wing, 1999; Teixeira, et al., 2004), others did not find any relationship (Wadden, Foster, & Letizia, 1994), and finally another study found that binge status had a protective effect against dropout (Ho, et al., 1995). In the QUOVADIS study, no significant differences were observed in the score of the Binge Eating Scale (Gormally, Block, Daston, & Rardin, 1982) between continuers and dropouts (Dalle Grave, Calugi, et al., 2005)(Table 2).

Depression

Higher levels of depression have been associated with treatment attrition in obese (Clark, et al., 1996; Teixeira, et al., 2004), and in obese with diabetes (Marcus, Wing, Guare, Blair, & Jawad, 1992). However, the QUOVADIS study did not observe significant differences in the Depression score of the Symptom Check List-90 (SCL-90)(Derogatis & Melisaratos, 1983) between continuers and dropouts (Dalle Grave, Calugi, et al., 2005)(Table 2).

Stress

Two studies observed that the overall level of stress discriminates patients who discontinue treatment from those who complete their program (Wadden & Letizia, 1992; Yass-Reed, et al., 1993).

Medical Variables

The impact of medical comorbidities in attrition from weight loss treatment has never been clearly demonstrated. Although the common sense would indicate that motivation might be increased by comorbidities, pharmacologically-untreated high blood pressure (Clark, et al., 1996) and a higher number of obesity-related diseases (Inelmen, et al., 2005) have been surprisingly associated with higher attrition rates.

Quality of Life Variables

One study found that noncompleters had lower level of physical, mental and weight-related quality of life, as measured by the Medical Outcome Survey Short Form-36 and by the Impact of Weight on Quality of Life-Lite questionnaires (Kolotkin, Crosby, & Williams, 2002).

Treatment variables associated with attrition

Practical Difficulties

Weight loss programs have a strong impact on everyday life . Repeated visits to the medical center may interfere with working activities, and dieting may disrupt family and social life.

In the QUOVADIS study, practical difficulties accounted for almost half of the primary causes for attrition (45%) reported by dropouts (Grossi, et al., 2006)(Table 3). These difficulties included family problems, problems at work, distance problems (all linked with time constraints) and health problems other than obesity. Practical difficulties seems to play a major role in both early and late dropout, since no relation was observed between time to dropout and the prevalence of practical difficulties (Grossi, et al., 2006).

Unsatisfactory Results

In one study, 57% of dropouts indicated that slow weight loss was responsible of their withdrawal from treatment (Perri, et al., 1984). A subsequent study found that women who dropped out during the

first three month of treatment had achieved a significant lower weight loss than continuers (Wadden & Letizia, 1992). These findings were confirmed by the observation that unsatisfactory results were the second reason of attrition (14%) reported by the QOVADIS study participants (Grossi, et al., 2006)(Table 3). Unsatisfactory results may lead to loss of motivation, whereas a large weight loss in the initial phase of treatment may strengthen adherence.

Table 3

Reported reasons for attrition in obese patients of the QOVADIS study. The reasons were collected during a phone interview carried out after a mean period of 41 months from enrollment in 766 patients who had discontinued treatment (Dalle Grave, Melchionda, et al., 2005; Grossi, et al., 2006).

Reasons for treatment stop *	Total number and % within group
Disagreement with the treatment plan	n = 45
Satisfied with treatment results	n = 38
Confident to loose additional weight without professional help	n = 64
Logistics	n = 279
Living far from the medical centre	104 (37%)
Work problems	143 (51%)
Family problems	151 (54%)
Financial problems	17 (6%)
Health problems other than obesity	58 (21%)
Holidays	1 (0%)
Unsatisfactory results	n = 139
Unsatisfied with weight loss	68 (49%)
Unable to keep following treatment program	82 (59%)
Lack/loss of motivation	n = 94
Other reasons	n = 44
Lack of encouragement, sense of abandonment	23 (52%)
Bad interaction with health personnel	10 (23%)
Personal health problems	8 (18%)
Choice of other treatments/centres	6 (14%)
Shame for being unable to cope with prescriptions	6 (14%)
Program too difficult to follow	5 (12%)
Administrative problems barriers	5 (12%)
Problems in taking appointments	4 (9%)
Health problems of husband	2 (5%)
Turn around of medical personnel	2 (5%)
General practitioner influence	2 (5%)
Other reasons	16 (36%)

*Patients were allowed to report more than one reason for treatment stop. A few patients did not report reasons.

Type and Setting of Treatment

Two reviews analyzing 17 and 13 group behavioural weight loss programs found an average rate of attrition of 13.5% (Wilson, 1980) and 13.8% (Wadden & Bell, 1990), respectively. Attrition in group

behavioural weight loss treatment is much lower than the 35% to 70% reported in commercial setting using conventional low calorie diets (Wadden & Letizia, 1992), the 55% to 75% reported in hospital-based very low calorie diets (Wadden & Letizia, 1992), and the 81.5% in clinical continuous care settings (Grossi, et al., 2006). Comparison between these data must be taken cautiously since different studies had heterogeneous modality of recruitments and the observation period varied dramatically (from about 24 weeks in the typical groups of behavioral weight loss programs to 40 months in the QUOVADIS study). Interestingly, a multicenter controlled trial that compared 63 obese men and women who were randomly assigned to either a low-carbohydrate, high-protein, high-fat diet or a low-calorie, high-carbohydrate, low-fat (conventional) diet found no significant differences in attrition between groups (Foster, et al., 2003).

Miscellaneous Reasons

In the QUOVADIS study, the majority of patients reported multiple reasons for attrition (Grossi, et al., 2006). After practical difficulties, unsatisfactory results and lack/loss of motivation (12%) (Table 3), the main reason reported by patients was the confidence in the ability to lose additional weight without professional help (9%). Forty-four patients (8%) reported 'other reasons' for attrition. Within this subset, there was seven pregnancies, six cases of 'personal problems', four surgical interventions, three cases of depression, and a number of single different causes. Satisfaction with the results achieved during treatment was the reason for interrupting the contact with the obesity center in 7% of cases, and disagreement with the treatment plan in 5%. A large percentage of patients (9%) reported the feeling of being abandoned by the clinical personnel after an initially intensive program, or an unsatisfactory interaction with the therapists. One hundred and seventy-one patients gave differently combined causes for attrition. The most common combinations were (a) unsatisfactory results associated with non-adherence and (b) practical difficulties associated with lack of motivation or other reasons. In general, over 140 different causes or combinations were selected by patients to describe the reasons of their premature program termination, which could be assembled in at least 30 different prototypes.

Are all drop-outs treatment failures?

The QUOVADIS study provides data on long-term weight loss in 1,000 patients treated in 15 Italian obesity centers applying a continuous care model of medical treatment (Dalle Grave, Melchionda, et al., 2005). After 36-month follow-up, the mean percentage weight loss was significantly greater in continuers than dropouts (5.2% vs. 3.0%), thus supporting the advantage of the continuous care model. However, an interesting observation of the study was that the dropouts satisfied with the results achieved or confident in their ability to lose additional weight without professional help reported a mean weight loss of 9.6% and 6.5%, respectively, figures that are on average larger than in continuers. This observation indicates that not all the dropouts must be considered treatment failures.

Discussion

This review confirms that attrition in weight loss treatment is an extremely complex process, influenced by a combination of several patients' pretreatment characteristics and treatment variables, differently interacting in individual patients. It is conceivable that conflicting results are partly due to the different type and length of treatment, and partly to the definition of attrition. However, the predictive role of some patients' pretreatment characteristics and treatment variables on attrition have been confirmed by more than one study and new data of clinical utility come from large observational studies.

In general, practical difficulties, unsatisfactory results, psychological variables and type of treatment seem to play a crucial role in the patients' decision of interrupting the weight loss treatment.

Practical difficulties, as cause of attrition, received a lot of interest in cancer-screening programs (Bergenmar, Tornberg, & Brandberg, 1997), and interviews were used to develop programs to reduce non-attendance (Elkind, Eardley, Haran, Spencer, & Smith, 1989). The QUOVADIS study found that more than half of the reported reasons for attrition to follow-up were linked to practical problems. These problems arise from organizational or physical barriers, which are often overlooked in clinical medicine and should be carefully matched in the future.

Unsatisfactory results, in particular a modest initial weight loss, are reported by patients as one of the principal reasons for treatment interruption in retrospective analysis (Grossi, et al., 2006; Wadden, Foster, Letizia, & Stunkard, 1992). Unsatisfactory results could be in part the consequences of patients' unrealistic weight loss expectations. In the QUOVADIS study (Dalle Grave, et al., 2004), both dream weight and maximum acceptable weight largely exceeded the weight loss target recommended by international guidelines (World Health Organization, 2000). Higher weight loss expectations were the strongest predictors of attrition at long-term follow-up in subjects under continuous care (Dalle Grave, Melchionda, et al., 2005). A proposed factor linking unrealistic weight loss expectations and attrition is the dissatisfaction with weight loss obtained with treatment (Dalle Grave, Calugi, et al., 2005). Support to this hypothesis comes from the finding that the difference between weight goals and treatment-induced weight loss is correlated with post-treatment satisfaction (Foster, Wadden, Vogt, & Brewer, 1997). The higher is this difference, the greater is dissatisfaction, and frustrated patients tend to interrupt the treatment. In the QUOVADIS study, dissatisfaction with the results was reported as a major cause of attrition by 25% of dropouts (Dalle Grave, Melchionda, et al., 2005). Interestingly, also satisfactory results achieved with treatment are associated with attrition, but this reason cannot be considered a treatment failure, since these patients reported an even larger mean weight loss than continuers at long-term follow-up (Dalle Grave, Melchionda, et al., 2005).

Other psychological variables that seem to play an important role in predicting attrition include lack of motivation, overall levels of stress, self-confidence in the ability to lose additional weight without professional help, and sense of abandonment from therapists. The psychological obstacles are rarely addressed during weight loss treatment and this could be the main reason of treatment failure in a few patients. Behavioral weight control programs have typically been standardized as group interventions based on psycho-education more than on psychological therapy (Cooper, Fairburn, & Hawker, 2003). To overcome these limitation a new cognitive behavior therapy for obesity (Cooper, et al., 2003) has been developed to address ambivalence using well-established strategies to enhance motivation, and to remove psychological and behavioral individual obstacles to weight loss and weight loss maintenance (e.g. promoting greater acceptance of realistic loss goals, addressing binge eating). While data on efficacy are not yet available, the importance of addressing motivation to reduce attrition is supported by a study in which adding three sessions of a motivational interview (Miller & Rollnick, 2002) to a behavioral weight control program for patients with Type 2 diabetes resulted in a significantly better adherence to treatment and a better glucose control compared with the weight loss program alone (Smith, Heckemeyer, Kratt, & Mason, 1997).

The type and the duration of treatment are also other important factors associated with attrition. Group behavioral weight loss programs applied in a research setting reported a very low attrition rate (around 13.5%). Higher rates of attrition (from 35% to 81.5%) have been reported in commercial and continuous care clinical setting. Behavioral weight loss programs are typically delivered in closed groups and follow a structured and time-limited protocol. It has been suggested that closed-group formats facilitate cohesiveness and interaction (Yalom, 1985), while the structured and time-limited protocol gives the patients specific goals and methods of achieving weight loss (Wadden & Letizia, 1992). These two factors are not usually present in commercial and clinical programs; they could be the reason for the low attrition rate reported in behavioral weight loss programs. A partial support to this hypothesis comes from the observation that patients treated with very low calorie diets and behavior therapy in closed and

time limited groups tend to have a lower dropout rate than patients treated by similar diets but with open-group sessions and open-ended therapy (Wadden & Letizia, 1992). However, the lower attrition rate of behavioral weight loss programs could also be determined by other factors, such as the inclusion of more motivated patients, and subjects with a lower number of medical and psychological comorbidities.

Other factors, such as BMI, age, gender, dietary restraint, body fat distribution, binge eating, depression have been associated with attrition in some studies but not in others. The reasons of these conflicting results are not entirely known. It is possible that some factors are predictive of attrition only in subjects undergoing specific treatments, and not in subjects enrolled in other programs that adopt different procedures and strategies. Future studies have to investigate this hypothesis.

Finally, a variety of factors, such as age of first diet, number of previous diets, dietary habits, full time job, smoking, medical comorbidities, diet composition, and quality of life, have been observed to predict attrition only in selected reports, and their role in different settings remains to be determined.

The data of this review have clinical implications. Firstly, physicians are mostly interested in the clinical evaluation, while patients' practical difficulties to adhere to treatment (e.g. social and familial environments) are rarely considered a relevant part of the interview. Physicians should dedicate part of the office consultation to understand and/or to remove barriers, in order to improve patients' compliance to treatment (Grossi, et al., 2006). Secondly, the importance of motivation in the failure of weight loss programs makes the assessment of motivation a core procedure for all obese patients both before and during treatment. It has been recently suggested that a motivational interview could be used as a separate intervention throughout the course of treatment, when the motivation of obese patients decreases (Wilson & Schlam, 2004). Thirdly, the association between early weight loss and attrition indicates that an intensive treatment in the first part of the program might be useful. Increasing the number of sessions from once a week to twice weekly in the first month could be a potential effective way to increase the rate of initial weight loss and consequently to reduce the rate of attrition. Fourthly, the association between unrealistic weight loss expectations and attrition indicates that the problem of weight loss goals should be addressed both in the initial interview and during the entire course of the treatment. This would help to detect and to address promptly any warning sign of weight loss dissatisfaction, thus minimizing the risk of attrition (Dalle Grave, Calugi, et al., 2005). Specific strategies to change weight goals have been recently described in the modern cognitive behavioral treatments of obesity (Cooper, et al., 2003). Our clinical experience with obese patients suggests that a trusting and collaborative relationship between physician and patient is a crucial aspect favoring the modification of unrealistic weight goals (Dalle Grave, Calugi, et al., 2005). The development of a trusting and collaborative relationship is also a key factor to avoid the sense of abandonment from therapists that patients report as one of the major reason of attrition. Fifthly, the data linking overall stress with attrition confirm the clinical impression (Wadden & Letizia, 1992) that patients experiencing stressful life events should wait for a more peaceful period to initiate their weight loss program. Even if the data on depression and binge eating are not unequivocal, our clinical experience suggests that patients with severe clinical depression should be treated for this disorder before starting a weight loss program, while patients with binge eating should be helped address this eating disorder behavior during treatment if it constitutes an obstacle to weight loss (Cooper, et al., 2003). Sixthly, the lower attrition rate of group behavioral weight loss programs suggest that some procedures adopted by these treatments (e.g., accurate recruitment, closed groups and a structured and time-limited protocol) should be incorporated into standard clinical practice. Finally, the good results on weight loss obtained by dropout patients confident to loose weight without any additional professional help and satisfied with the results achieved suggest that clinician should dedicate time to help the patients to increase their self-efficacy and to develop a positive acceptance of the weight loss achieved with treatment.

Future studies should evaluate more carefully both patients' pretreatment variables (e.g., depression, binge eating, age) and treatment variables (e.g. practical difficulties, quality of therapeutic relationship, type and duration of therapy) associated with attrition. This careful evaluation must be systematically carried out in any clinical setting, since most data on attrition come from obesity weight loss trials in which some procedures (e.g., the use of specific inclusion and exclusion criteria) could conceal the common factors associated with attrition in the real world treatment. The experience with the QUOVADIS study suggests that it is possible to retrieve a sizable amount of information regarding obese patients lost to follow-up in typical clinical settings by means of a structured telephone interview from 3 to 4 years after treatment stops. Over 75% of participants were traced and most of them were collaborative with the interviewer, and agreed to answer the 54 questions of the interview (Grossi, et al., 2006).

In conclusion, there is now evidence that new strategies may be adopted to decrease the attrition rate in the treatment of obesity. The strategies proposed in this review and by others (Wadden & Letizia, 1992) should be evaluated in randomized controlled trials or in large observational studies with adequate statistical power. The results are likely to be of great value in improving clinical outcomes.

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