Name of journal: World Journal of Psychiatry

ESPS Manuscript NO: 15201

Columns: REVIEW

**Assessment of psychological predictors of weight loss: How and what for?**

Lazzeretti L *et al.* The assessment of psychological predictors of weight loss

Lisa Lazzeretti, Francesco Rotella, Laura Pala, Carlo Maria Rotella

**Lisa Lazzeretti**, Psychiatric Unit, Careggi University Hospital, 50141 Florence, Italy

**Francesco Rotella**, Psychiatric Unit and Diabetes Agency, Careggi University Hospital, 50141 Florence, Italy

**Laura Pala**, Endocrinology Unit, Careggi University Hospital, 50139 Florence, Italy

**Carlo Maria Rotella**, Department of Biomedical Experimental and Clinical Sciences, Obesity Agency, Careggi University Hospital, 50139 Florence, Italy

**Author contributions:** All authors gave a substantial contribution in the conception of the work, in the selection of papers and in drafting and revising the paper; all authors gave their approval for publication to the final version of the article.

**Conflict-of-interest:** All authors do not have any conflict of interest to disclose.

**Open-Access:** This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

**Correspondence to: Francesco Rotella, MD,** **PhD,** Psychiatric Unit and Diabetes Agency, Careggi University Hospital, Largo Brambilla 3, 50141 Florence, Italy.francesco.rotella@unifi.it

**Telephone:** +39-05-57947487

**Fax:** +39-05-57947487

**Received:** November 13, 2014

**Peer-review started:** November 16, 2014

**First decision:** December 26, 2014

**Revised:** January 12, 2015

**Accepted:** February 4, 2015

**Article in press:**

**Published online:**

**Abstract**

Obesity is a multifactorial disease and the prominent factors playing a role in its pathogenesis are biological, environmental and psychological. There is a growing interest in understanding psychological functioning of obese subjects and the influence of psychological factors on treatment outcome. The aim of the present narrative review is to critically analyze the current literature, in order to point out the most common psychological constructs studied in obesity and to give an overview of the main existing tools investigating psychological features which have been considered significant for the prediction of success in weight loss and maintenance programs in obese patients. In this framework, the most common psychological constructs studied are: self-motivation, self-efficacy, locus of control, health related quality of life (HRQL), self-esteem, self-control, concerns about body image, outcome expectations, and personality traits. These features have been explored through a wide variety of psychometric instruments. However, as an overall, studies evaluating the association between psychological features and treatment outcome failed to give consistent results. A possible explanation may consist on the fact that many tools widely used to explore psychological features were not specifically designed for obese patients and none of them was comprehensive of all possible psychological features involved. The identification of well-defined sub-groups of patients and the validation of more reliable and comprehensive tools, specifically designed for obese subjects, should be forecasted in order to reach a better knowledge of psychological functioning of obese individuals and to improve the outcome of weight loss programs.

**Key words:** Obesity; Eating behaviors; Psychometrics; Psychological assessment; Psychological predictors

**© The Author(s) 2015.** Published by Baishideng Publishing Group Inc. All rights reserved.

**Core tip**: A wide range of psychological conditions are bi-directionally linked to obesity. Psychological features may account for poor compliance and outcome in weight control programs but the current knowledge regarding this topic of research seems to be largely incomplete as studies investigating whether psychological factors could be reliable treatment predictors failed to give consistent results. The aim of the present narrative review is to critically analyze current literature in order to better identify which psychological features can predict outcome in weight loss and maintenance programs, and to summarize the psychological tools most widely used for this purpose.

Lazzeretti L, Rotella F, Pala L, Rotella CM. Assessment of psychological predictors of weight loss: How and what for? *World J Psychiatr* 2015; In press

**INTRODUCTION**

In the last decade obesity and overweight have become a global burden: the World Health Organization estimates that in 2005 approximately 1.6 billion people worldwide were overweight, 400 million adults were obese and at least 20 million children under the age of 5 years were overweight[1]. While in the foretimes overweight and obesity were widespread only in high-income countries, these conditions have now dramatically risen in low- and middle-income countries[2]. These countries are now facing a “double burden” of disease: they continue to deal with infectious diseases and under-nutrition, but they are also experiencing a rapid upsurge in risk factors for cardiovascular diseases and diabetes due to the increase of obesity and overweight. Experts believe that, if the current trend will continue, by 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese[1].

Obesity has a number of serious consequences for individuals and governmental health organizations. In addition to the implications for the health of individuals, obesity enhances the risk of many diseases, which can contribute, directly or indirectly, to premature death and severe disability[3,4]. For this reason, overweight and obesity have a significant economic impact on health systems. The medical costs associated to overweight and obesity are represented by both direct (prevention, diagnosis, and treatment) and indirect costs (decreased productivity, restricted activity, absenteeism, and bed days).

Obesity is a complex disease since a great number of factors play a role in its pathogenesis: behaviors, environment, culture, socioeconomic status, genetic and biological features. All these aspects play a role and may have an effect in determining people to be overweight and obese[5]. However, the prominent factors involved in the recent worldwide epidemic diffusion of obesity are likely to be an increased intake of energy and the decreased physical activity or sedentary lifestyle[4]. It has been observed a global shift in [diet](http://www.news-medical.net/health/Low-calorie-and-very-low-calorie-diets.aspx) towards energy-dense foods that are high in fat and sugars. Conversely, vegetables and fruits, which are rich in vitamins, minerals and other micronutrients, are less consumed, and this occurs along with a trend towards decreased physical activity[2]. For these reasons, it has been suggested that “obesity is the result of people responding normally to the obesogenic environments they find themselves in”[6].

In addition to environmental factors, also a genetic predisposition to obesity has been observed. Single gene mutations are responsible for rare forms of monogenic obesity[7] and common genetic variants of single-nucleotide polymorphisms may significantly increase the risk to develop obesity during lifespan[8,9]. Some of these obesogenic genes might also affect weight loss and weight loss maintenance. It has been demonstrated that polymorphisms of several obesity candidate genes have been shown to influence the outcome of weight management[9].

Psychiatric disorders and psychological features have been also reported as conditions which may play a significant role in developing obesity. With respect to psychiatric disorders, the highest comorbidity rates have been obviously reported for Binge Eating Disorder and other atypical Eating Disorders[10,11]. However, also Depression and Anxiety Disorders have been associated to obesity. This association seems to be bidirectional since depression and anxiety are associated with unhealthy behaviors including higher caloric intake, alcohol abuse and physical inactivity, which are risk factors for obesity. Conversely, obesity leads to an increased lifetime risk of both Depression and Anxiety[12,13] and it is well known that most of the antidepressant treatments can induce weight gain[14].

Moving to psychological correlates of obesity, some studies aimed primarily at identifying domains of psychological dysfunction associated with obesity have been published[15-17]. However, in the last years, the emphasis has shifted to look at the causal relationships between body weight and psychological distress and how this may affect treatment outcome[18]. Again, the association with obesity seems to be bidirectional: obese individuals face stigmatization and discrimination in many domains of their lives, and their psychological well-being is usually compromised[19]. On the other hand, it has been proposed that specific aspects of psychological functioning may increase the risk of developing obesity[20].

A significant proportion of obese patients do not display psychiatric comorbidities[15,21]. However, also in these cases, it has been hypothesized that the psychological asset may be strictly associated to unhealthy behaviors, to a fickle compliance and to a worse outcome of weight loss programs[22,23]. As unhealthy behaviors are considered the prominent factors in developing obesity, in order to improve the treatment of obesity, the processes that promote successful behaviors and the adoption of healthy habits should be better acknowledged.

Despite the growing interest in understanding psychological functioning of obese subjects, the current knowledge regarding this topic of research seems to be largely incomplete. One of the main obstacles to research in the field of psychological features interfering with obesity onset and management is represented by the heterogeneity of potentially relevant factors, usually explored through a wide variety of psychometric instruments.

Given these premises, the aim of the present narrative review is to critically analyze the current literature, in order to point out the most common psychological constructs studied in obesity and to give an overview of the main existing tools investigating psychological features which have been considered significant for the prediction of success in weight loss and maintenance programs in obese patients.

**PSYCHOLOGICAL FEATURES USED AS TREATMENT PREDICTORS AND THE MAIN TOOLS FOR PSYCHOLOGICAL ASSESSMENT**

Psychometric instruments in the field of obesity research are used to evaluate the psychological health of obese patients before, during, and after treatment. Psychometric questionnaires are important to compare the results of different weight management programs, and to understand the connection between medical and psychological factors in obesity[24].

The identification of factors accounting for good compliance and positive outcome in weight control programs is a major topic of research. Psychological features seem to play a key-role in the treatment of obesity and have been frequently investigated in order to reduce the lack of compliance and to improve effectiveness of dietary treatment, suggesting that a good psychological functioning may be associated with higher success rates in treatment and that weight loss may be associated to beneficial effects on many different areas of psychological functioning[25].

The psychological constructs most commonly investigated are: self-motivation, self-efficacy, locus of control, HRQL, self-esteem, self-control, concerns about body image, outcome expectations, and personality traits. Table 1 summarizes the questionnaires which have been more commonly used for the evaluation of these psychological features, as well as their main acknowledged limitations (if reported).

Teixeira *et al*[22], in a comprehensive review summarizing studies published from 1995, has evaluated which psychosocial aspects can be considered as potential predictors of weight loss and weight management[22]. Authors organized these predictors into three groups on the basis of the evidence found in literature: (1) with consistent evidence; (2) with mixed evidence; and (3) with suggestive evidence. Only a few predictors met the criteria to be included in the first group: less previous dieting, fewer weight loss attempts, self-motivation, general self-efficacy (in contrast to eating-related self-efficacy), and autonomy[22].

SELF-MOTIVATION

Self-motivation is a trait-like construct conceptualized as “a behavioral tendency to persevere independently from situational reinforcements”[26]. The instrument most widely used to measure motivation in obesity is the Self-Motivation Inventory (SMI), which has been generated to predict adherence to therapeutic exercise in preventive and rehabilitative medicine programs[26]. SMI has been frequently used in literature and it has demonstrated to predict treatment success in weight loss programs[27].

Other questionnaires that evaluate self-motivation have been rarely used in the field of obesity. For this reason, they have not been included in Table 1. The Weight Loss Readiness Test[28], a questionnaire developed to assess weight loss readiness and motivation, failed to predict weight loss and weight maintenance[27,29]. Recently, a new questionnaire evaluating motivation and readiness to treatment has been created and validated[30]. This test seems to be capable to identify those individuals with high desire to overcome the problem and with low obstacles in pursuing the treatment. Under these conditions, obese patients reach the goal of loosing weight more frequently than obese subjects who did no display these traits. However, in a more recent study, the same authors found that the test seems to be capable to predict weight loss only in men, suggesting that in women, other psychiatric or psychological factors may play a greater role[31]. Since the questionnaire has been published in the last few years, it has not been widely used or tested in populations different from those used for its validation.

As already said, self-motivation has been considered as a predictor of success with consistent evidence[22] and the findings of Teixeira *et al*[22] are in agreement with earlier findings[27] and with more recent studies which reported an association of self-motivation with weight loss and weight loss maintenance (*e.g*., Cresci *et al*[32]).

Furthermore, motivational interviewing used to increase motivation for change and to improve treatment outcomes, appears to enhance weight loss in overweight and obese patients[33,34].

**SELF-EFFICACY**

Bandura has defined self-efficacy as the combination of outcome expectancies and efficacy expectancies and has suggested that behavioral changes require both the belief that the changes will result in the desired outcomes (outcome expectancies) and the belief that each individual is capable of making the change (efficacy expectancies)[35,36]. Both general self-efficacy and eating-related self-efficacy have been measured in obesity research. The first one is mainly assessed using the General Self-Efficacy Scale (GSES) originally developed by Schwarzer and Jerusalm[37]. GSES measures how an individual judges his/her own competence in order to complete tasks (by the means of behaviors, thoughts, and emotions) and reach desired goals. Eating self-efficacy has been frequently assessed in obese individuals with the Eating Self-Efficacy Scale (ESES)[38] and the Weight Efficacy Life-Style (WEL) Questionnaire[39], which are considered useful tools to measure self-efficacy in obesity, especially for clinicians working with weight control programs. In fact, almost all the studies on self-efficacy have led to the conclusion that high self-efficacy towards eating behaviors is associated with success in weight management[40-44].

LOCUS OF CONTROL

Locus of control refers to the extent to which individuals believe they can control events affecting them. Locus of control is one of the four dimensions of core self-evaluations along with neuroticism, self-efficacy, and self-esteem[45]. The most commonly used instruments for measuring locus of control in obesity are the Internal-External (I-E) scale[46], the Multidimensional Health Locus of Control (MHLC) Scale[47], the Dieting Beliefs Scale (DBS)[48] and of the Weight Locus of Control (WLOC) scale[49]. The I-E scale was the first tool specifically designed to assess locus of control, but it does not include specific items to investigate expectations about health or weight.

In the last decades, a large body of literature has investigated the role of health-related control beliefs in influencing the course of chronic diseases, medication compliance and health promoting behaviors. The vast majority of studies have used different forms of the MHLC Scales developed by Wallston *et al*[47]. While the A and B forms were constructed to measure general health-related control beliefs without being specific to any health behavior or condition, form C was developed to investigate health-related control beliefs of individuals with an existing medical condition[50]. MHLC measures three possible localizations of health control: internal localization, called “internality” (internal locus of control, measured by a subscale named IHLC) and two external localizations called “powerful others externality” (measured by the subscale PHLC) and “chance externality” (measured by the subscale CHLC)[50]. Patients with high internality believe that their health status depends only on their own behaviors; patients with high powerful others externality are convinced that their individual health status is the consequence of the actions performed by powerful people, *e.g.*, doctors, family members, friends; patients with high chance externality believe that mainly chance, fate, or luck determine their health status[50]. Despite a large use of the MHLC Scale in obesity, information retrieved by its administration does not seem to add specific or accurate knowledge concerning weight-related control beliefs.

Two questionnaires more specifically designed for overweight and obesity are the Dieting Beliefs Scale (DBS)[48] and the Weight Locus of Control (WLOC) scale[49]. These tests investigate weight-related control beliefs and have been frequently used in obesity research. Allison and Engel[51] reported that an internal locus of control is a beneficial trait regarding weight management and conclude that health- and weight-specific locus of control are more predictive than more general measures[51]. Wamsteker *et al*[44] found that less weight reduction is associated with the beliefs that obesity has a physical origin and is not under behavioral control. Wiltink *et al*[52] identified the attribution of overweight to eating habits as a factor predicting long-term weight loss in severe obese patients attending psychotherapy; whereas Nir and Neumann[53] found that an internal locus of control was related to a lower weight regain after a weight reduction program.

However, some studies failed to identify differences between “internals” and “externals” in terms of weight loss and weight maintenance[54].

QUALITY OF LIFE

HRQL refers to the “psychological, physical and social domains of health, seen as distinct areas that are influenced by a person’s experiences, beliefs, expectations, and perceptions”[55]. Studies addressing HRQL as a pre-treatment predictor of weight outcomes have used instruments which may be divided into generic and disease-specific tools. The most widely generic tool used is the SF-36[56], which measures eight not-disease-specific domains. SF-36 has been frequently used in obesity research, but its main limitation consists in the fact that it has not been designed to detect the effect of overweight on quality of life (QoL)[5].

The instruments specifically developed for obese subjects include the Impact of Weight on Quality of Life (IWQoL) questionnaire[57] and the Impact of Weight on Quality of Life questionnaire-lite (IWQoL-lite)[58], which assess the effects of weight on QoL in eight areas and five areas, respectively; and the Obesity related well-being (Orwell 97) questionnaire[59], which assesses QoL across three areas and proposes that symptoms of similar intensity can have a different impact depending on the individual (items about the occurrence, severity, and relevance of each impairment on its own life are included in the test).

From one side, there is evidence that weight loss improves HRQL in obese subjects[60-62]. On the other hand, there is poor evidence for QoL as treatment predictor. Only few studies explored QoL as a predictor of success in obesity treatment and Teixeira *et al*[63] found an association between pretreatment quality of life measures and long-term outcomes of a lifestyle weight loss programs; whereas Rotella *et al*[31] did not confirm this result.

**SELF-ESTEEM**

Self-esteem has been defined as “a personal judgment of the worthiness that is expressed in the attitudes the individual holds towards himself”[64]. The main assessment tool used to evaluate self-esteem in obesity is the Rosenberg Self-Esteem (RSE) scale[65]. RSE measures global self-esteem, whereas other instruments such as the Coopersmith Self-Esteem Inventory and the Tennessee Self-Concept scale[64], which have been used only sporadically in obesity research (not included in Table 1), are multidimensional, as they measure self-concept (of which self-esteem is just one component) and the sub-domains of self-esteem (performance, social, and physical self-esteem).

Usually, clinical samples show lower self-esteem than community samples (both normal- and overweight)[66,67], and studies that investigated the impact of weight loss treatment on self-esteem typically report improvements in almost all its dimensions[68,69]. As a possible predictor of success, self-esteem has not been frequently investigated. However, a recent study reported that lower self-esteem may be related to unhealthy weight control behavior in women[70].

**SELF-CONTROL**

Self-control is the ability to refrain from acting on undesired behavioral tendencies[71]. The 36-item Tangney Self Control Scale (SCS) measures general self-control and although it has been used in a number of studies to measure self-control in relation to eating behaviors and weight managment[72-74], the control over eating is often measured by using the revised shortened versions of the original Three-Factor Eating Questionnaire (TFEQ)[75-77], which measures three domains of eating behaviors: cognitive restraint (control over food intake to influence body weight and body shape), uncontrolled eating (tendency to lose control over eating when feeling hungry or when exposed to external stimuli), and emotional eating (propensity to overeat in relation to negative mood states). The two shortened versions have been developed in an obese population after it has been demonstrated that the original three factor structure lost its sensitivity in those samples[76].

Control over eating, measured with the subscales of the TFEQ, has been associated with weight reduction and successful weight maintenance[54,78-80], whereas a decreased eating restraint and increased in disinhibition have been found in those regaining body weight after the end of a weight loss program[81,82]. However, some studies failed to demonstrate the ability to predict weight loss based on pre-treatment TFEQ scores[83,84].

**BODY IMAGE AND OUTCOME EXPECTATIONS**

Body image is a multidimensional construct which includes: (1) the perceptual component, which refers to a person’s skill to estimate precisely the actual size and shape of the body; (2) the attitudinal component, including one’s cognitions and affect, having reference to the body; and (3) the behavioral component, which concerns a person’s engagement in specific actions and the potential shunning of particular situations/environments[85]. The difference between the individual perception of his/her current body size and ideal body size is related to body satisfaction[86]. Up to 74% of obese patients have body image dissatisfaction and distortion[11], so this construct has been frequently assessed in pre-treatment psychological batteries. Several instruments are available to measure body image, concerns about body shape and body satisfaction. The most widely used are: the Body Attitude Questionnaire (BAQ)[87], the Body Shape Questionnaire (BSQ)[88], the Physical Self-Perception Profile (PSPP)[89], the Body Cathexis Questionnaire[90], the Body Satisfaction Scale (BSS)[91] and the Body Parts Dissatisfaction Scale (BPDS)(Corning et al, 2010)[92]. The BAQ explores a broad range of attitudes that subjects hold toward their body; its subscales encompass six distinct aspects of body experience. The BSQ is one of the most valid psychometric instruments for the assessment of distress related to body image and weight in obese individuals seeking weight reduction. The PSPP is widely used to measure self-evaluations in the physical domain and its validity has been supported in a wide range of samples; it assesses five subdomains of physical self-perceptions. The Body Cathexis Questionnaire assesses feelings towards various body parts or characteristics. In the BSS respondents are asked to rate each of 16 body parts on a seven-point scale ranging from “very satisfied” to “very dissatisfied”; the scale was designed for work in health-related fields: in particular the scale was used to assess body dissatisfaction in eating disorders and to monitor changes in body satisfaction in subjects undergoing surgical treatment for breast cancer[91]. The BPDS lists 7 body parts and asks whether there is a desire to change any part.

Finally, the Body Uneasiness Test[93] can be considered a really valuable tool to assess and measure body dissatisfaction. However, this test has been largely used only in Italy and for this reason it has not been included in Table 1.

More recent studies investigating possible predictors of weight outcome in obese patients used the Goals and Relative Weights questionnaire[94]. Briefly, this test takes into account weight expectations asking subjects to indicate their “dream” weight, and weight values that they would be “happy” with, they would consider “acceptable”, and that they would be “disappointed” with, at the end of the weight loss program. The test does not include other areas of satisfaction or dissatisfaction linked to body weight or shape, and therefore it gives information of outcome expectations only related to the above mentioned parameter.

Many studies have found a link between body image, health and eating behaviors. Mond *et al*[95] suggested that shape concerns are an important mediator of the relationship between obesity and impairment in psychosocial functioning in obese women. Myers and Rosen[96] found that obese individuals with higher rates of body dissatisfaction used more maladaptive coping strategies, Traverso *et al*[97] reported that body image is a pretreatment variable significantly associated to weight loss and Teixeira *et al*[63] reported that weight loss treatment completers displayed more positive scores for body image than non-completers. With respect to treatment strategies, Schwartz and Brownell[98] identified body image intervention as a key point of weight loss treatments. Moreover, the tendency to evaluate oneself “worth” in terms of weight and shape has been identified as a factor characterizing the “weight regainers” in a retrospective study[99].

As already said, a dimension which is linked to body weight and image is “outcome expectations” in terms of weight modifications during treatment. The evaluation of outcome expectancies as possible predictors of weight loss has produced divergent results. Some authors have found that unrealistic expectations concerning weight loss frequently result in weight management failure and treatment discontinuation[9,63,100-102]. Conversely, different studies did not confirm these negative consequences of having unrealistic expectations for weight loss and weight loss maintenance[103,104] and did not support the hypothesis that obese patients should be encouraged to set lower weight-loss goals[105,106].

PERSONALITY TRAITS

Personality traits in the field of obesity research have been widely assessed using the Temperament and Character Inventory (TCI)[107] and the Karolinska Scales of Personality (KSP)[108]. The TCI was developed to provide a comprehensive evaluation of personality; it measures four dimensions of temperament (novelty seeking, harm avoidance, reward dependence and persistence) and three dimensions of character (self-directedness, cooperativeness and self-transcendence). On the other hand, the KSP was designed to evaluate abnormal personality, rather than variations in normal personality. It was originally developed to assess the personological traits associated to vulnerability for psychological deviance. In a number of studies personality traits in obese individuals have been assessed using the Five-Factor Model of personality (FFM, also known as the Big Five), which assesses five broad dimensions of human personality[109].

Alexithymic personality traits, which can be defined as the difficulty in describing feelings to others and in sharing inner experiences, are a psychological feature frequently observed in obese patients[110]. Alexithymia is usually assessed with the Toronto Alexithymia Scale (TAS-20)[111,112].

A great number of studies have investigated the link between personality traits and weight loss with varying degrees of success. Teixeira et al. in the above mentioned review reported that personality traits may be unrelated to obesity risk and weight management[22]. On the other hand, more recent studies have reported an association between personality traits and weight outcomes in weight loss programs: high scores in novelty seeking and low scores in reward dependence (assessed using TCI) were associated to decreased success in achieving weight loss; whereas the presence of lower narcissistic personality traits (assessed using TCI) has been reported as a positive predictor of weight loss[113,114]. Moreover, neuroticism has been associated to successful weight loss in obese patients following a very low energy diet[74].

A recent meta-analysis using inventories of the FFM and evaluating personality as a factor potentially explaining individual differences in long-term obesity risk or the likelihood of reversion from obese to non-obese, shows that the personality trait “conscientiousness” is robustly associated with the development and persistence of obesity[115]. Individuals with high conscientiousness are described as self-disciplined, task oriented and well organized, whereas low conscientiousness is characterized by poor self-control, impulsivity and lack of long-term planning[109]. Compared to individuals with low conscientiousness, individuals with high conscientiousness have almost 40% lower odds of being obese, and obesity was less persistent. Authors concluded that their findings lend support for conscientiousness being a prognostic factor for the reversion of obesity to non-obesity in initially obese individuals[115]. There is also evidence that individuals with high conscientiousness (measured with the revised NEO Personality Inventory which is intended to measure the [Big Five personality traits](http://en.wikipedia.org/wiki/Big_Five_personality_traits)[116]) lose more weight with pharmacological obesity treatment using orlistat[117].

Finally, in a study performed by De Panfilis *et al*[114], it has been suggested that obese patients with a co-occurent psychiatric disorders showed a poorer outcome when displaying higher alexithymic traits.

**CONCLUSION**

In obesity treatment, weight loss is very difficult to achieve and, once achieved, to maintain, and long term dietary compliance rates are usually very low. It is a matter of fact that more effective strategies to improve compliance rates for weight loss and weight maintenance are required.

Obesity is an heterogeneous and multi-factorial disease and pre-treatment psychological (as well as biological and environmental) differences among the obese subjects which are going to start a weight loss program may interfere with treatment outcome.

A major challenge for successful weight management is to specifically design weight loss programs to individual needs. It has been proposed that obesity treatment should be individually tailored taking into account age, sex, degree of obesity, individual hormonal, metabolic and hereditary factors, but also to psychobehavioral characteristics[9]. A good assessment of the psychological functioning could be used to identify “what fits whom” and therefore match individuals to a compatible weight loss program that would maximize weight loss. On the other hand, it could also be useful to identify subjects that should be put out of treatment because their likelihood of success is estimated as very low. In both cases, a reliable identification of psychological predictors of weight loss could lead to more efficient treatments and could help public health services to save time and resources.

However, the use of instruments measuring psychological functioning to identify appropriate weight loss and weight management strategies just remains an intriguing possibility. To date, none of the above mentioned associations seem to be reliable enough to base treatment regimens on them. The lack of evidence on this field is due by both conceptual and methodological factors.

First of all, only a small number of the questionnaires described in this review have been specifically designed for obesity or for weight-related problems[38,39,48,49,57-59]. For this reason, in obesity research the same construct is often assessed with many different instruments across studies, which are usually not specific for obese subject. Furthermore, a tool designed to address the more significant psychological constructs “all in one” does not exist. In other words, the psychological tools used in obese population are often inadequate and too heterogeneous.

Authors’ opinion is that research and clinical attention should be focused on two key-aspects: the definition of specific sub-groups of patients which may display different clinical features and psychological assets; and the identification of more reliable and comprehensive tools specifically designed on obese subjects. From one side these objectives could be reached through a wider and comprehensive psychological assessment of obese subjects, including features which are usually almost neglected in clinical settings. On the other hand, those traits which appear to be more strictly related to a better outcome in terms of weight loss and weight loss maintenance should be identified and highlighted during treatment programs for obese subjects. However, the final goal of this line of research should be to use these information in order to develop a specific psychometric instrument, more accurate in predicting responses to weight loss programs and which can be easily administered in a clinical setting, thus allowing clinicians to save time and energies and, at the same time, enabling sanitary institutions to save money.

**REFERENCES**

1 **World Health Organization.** Obesity. Available from: URL: http: //www.who.int/topics/obesity/en/

2 **James WP**. The epidemiology of obesity: the size of the problem. *J Intern Med* 2008; **263**: 336-352 [PMID: 18312311 DOI: 10.1111/j.1365-2796.2008.01922.x]

3 **Haslam DW**, James WP. Obesity. *Lancet* 2005; **366**: 1197-1209 [PMID: 16198769]

4 **Nguyen DM**, El-Serag HB. The epidemiology of obesity. *Gastroenterol Clin North Am* 2010; **39**: 1-7 [PMID: 20202574 DOI: 10.1016/j.gtc.2009.12.014]

5 **Kolotkin RL**, Meter K, Williams GR. Quality of life and obesity. *Obes Rev* 2001; **2**: 219-229 [PMID: 12119993]

6 **Swinburn BA**, Sacks G, Hall KD, McPherson K, Finegood DT, Moodie ML, Gortmaker SL. The global obesity pandemic: shaped by global drivers and local environments. *Lancet* 2011; **378**: 804-814 [PMID: 21872749 DOI: 10.1016/S0140-6736(11)60813-1]

7 **Andreasen CH**, Andersen G. Gene-environment interactions and obesity--further aspects of genomewide association studies. *Nutrition* 2009; **25**: 998-1003 [PMID: 19596186 DOI: 10.1016/j.nut.2009.06.001]

8 **Tiret L**, Poirier O, Nicaud V, Barbaux S, Herrmann SM, Perret C, Raoux S, Francomme C, Lebard G, Trégouët D, Cambien F. Heterogeneity of linkage disequilibrium in human genes has implications for association studies of common diseases. *Hum Mol Genet* 2002; **11**: 419-429 [PMID: 11854174]

9 **Hainer V**, Toplak H, Mitrakou A. Treatment modalities of obesity: what fits whom? *Diabetes Care* 2008; **31** Suppl 2: S269-S277 [PMID: 18227496 DOI: 10.2337/dc08-s265]

10 **Berkowitz RI**, Fabricatore AN. Obesity, psychiatric status, and psychiatric medications. *Psychiatr Clin North Am* 2011; **34**: 747-764 [PMID: 22098801 DOI: 10.1016/j.psc.2011.08.007]

11 **Tuthill A**, Slawik H, O'Rahilly S, Finer N. Psychiatric co-morbidities in patients attending specialist obesity services in the UK. *QJM* 2006; **99**: 317-325 [PMID: 16613993]

12 **Mather AA**, Cox BJ, Enns MW, Sareen J. Associations of obesity with psychiatric disorders and suicidal behaviors in a nationally representative sample. *J Psychosom Res* 2009; **66**: 277-285 [PMID: 19302884 DOI: 10.1016/j.jpsychores.2008.09.008]

13 **Luppino FS**, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BW, Zitman FG. Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Arch Gen Psychiatry* 2010; **67**: 220-229 [PMID: 20194822 DOI: 10.1001/archgenpsychiatry.2010.2]

14 **Serretti A**, Mandelli L. Antidepressants and body weight: a comprehensive review and meta-analysis. *J Clin Psychiatry* 2010; **71**: 1259-1272 [PMID: 21062615 DOI: 10.4088/JCP.09r05346blu]

15 **Friedman MA**, Brownell KD. Psychological correlates of obesity: moving to the next research generation. *Psychol Bull* 1995; **117**: 3-20 [PMID: 7870862]

16 **French SA**, Story M, Perry CL. Self-esteem and obesity in children and adolescents: a literature review. *Obes Res* 1995; **3**: 479-490 [PMID: 8521169]

17 **van Hout GC**, van Oudheusden I, van Heck GL. Psychological profile of the morbidly obese. *Obes Surg* 2004; **14**: 579-588 [PMID: 15186623]

18 **van der Merwe MT**. Psychological correlates of obesity in women. *Int J Obes (Lond)* 2007; **31** Suppl 2: S14-S8; discussion S14-S8; [PMID: 17968432]

19 **Wardle J**, Cooke L. The impact of obesity on psychological well-being. *Best Pract Res Clin Endocrinol Metab* 2005; **19**: 421-440 [PMID: 16150384]

20 **Neymotin F**, Nemzer LR. Locus of control and obesity. *Front Endocrinol* (Lausanne) 2014; **5**: 159 [PMID: 25339940 DOI: 10.3389/fendo.2014.00159]

21 **Herpertz S**, Burgmer R, Stang A, de Zwaan M, Wolf AM, Chen-Stute A, Hulisz T, Jöckel KH, Senf W. Prevalence of mental disorders in normal-weight and obese individuals with and without weight loss treatment in a German urban population. *J Psychosom Res* 2006; **61**: 95-103 [PMID: 16813851]

22 **Teixeira PJ**, Going SB, Sardinha LB, Lohman TG. A review of psychosocial pre-treatment predictors of weight control. *Obes Rev* 2005; **6**: 43-65 [PMID: 15655038]

23 **Dalle Grave R**, Calugi S, Corica F, Di Domizio S, Marchesini G. Psychological variables associated with weight loss in obese patients seeking treatment at medical centers. *J Am Diet Assoc* 2009; **109**: 2010-2016 [PMID: 19942018 DOI: 10.1016/j.jada.2009.09.011]

24 **Beechy L**, Galpern J, Petrone A, Das SK. Assessment tools in obesity - psychological measures, diet, activity, and body composition. *Physiol Behav* 2012; **107**: 154-171 [PMID: 22548766 DOI: 10.1016/j.physbeh.2012.04.013]

25 **Tseng MC**, Lee YJ, Chen SY, Lee MB, Lin KH, Chen PR, Lai JS. Psychobehavioral response and weight loss prediction in a hospital-based weight reduction program. *J Formos Med Assoc* 2002; **101**: 705-711 [PMID: 12517045]

26 **Dishman RK**, Ickes W. Self-motivation and adherence to therapeutic exercise. *J Behav Med* 1981; **4**: 421-438 [PMID: 7338896]

27 **Teixeira PJ**, Palmeira AL, Branco TL, Martins SS, Minderico CS, Barata JT, Silva AM, Sardinha LB. Who will lose weight? A reexamination of predictors of weight loss in women. *Int J Behav Nutr Phys Act* 2004; **1**: 12 [PMID: 15287984]

28 **Brownell KD**. Dieting readiness. Weight Control Dig 1990; 1: 5–10

29 **Fontaine KR**, Wiersema L. Dieting readiness test fails to predict enrollment in a weight loss program. *J Am Diet Assoc* 1999; **99**: 664 [PMID: 10361523]

30 **Cresci B**, Castellini G, Pala L, Ravaldi C, Faravelli C, Rotella CM, Ricca V. Motivational readiness for treatment in weight control programs: the TREatment MOtivation and REadiness (TRE-MORE) test. *J Endocrinol Invest* 2011; **34**: e70-e77 [PMID: 20834202 DOI: 10.3275/7263]

31 [**Rotella F**](http://www.ncbi.nlm.nih.gov/pubmed?term=Rotella%20F%5BAuthor%5D&cauthor=true&cauthor_uid=25038905)**,** [Lazzeretti L](http://www.ncbi.nlm.nih.gov/pubmed?term=Lazzeretti%20L%5BAuthor%5D&cauthor=true&cauthor_uid=25038905), [Barbaro V](http://www.ncbi.nlm.nih.gov/pubmed?term=Barbaro%20V%5BAuthor%5D&cauthor=true&cauthor_uid=25038905), [Castellini G](http://www.ncbi.nlm.nih.gov/pubmed?term=Castellini%20G%5BAuthor%5D&cauthor=true&cauthor_uid=25038905), [Bigiarini M](http://www.ncbi.nlm.nih.gov/pubmed?term=Bigiarini%20M%5BAuthor%5D&cauthor=true&cauthor_uid=25038905), [Cresci B](http://www.ncbi.nlm.nih.gov/pubmed?term=Cresci%20B%5BAuthor%5D&cauthor=true&cauthor_uid=25038905), [Ricca V](http://www.ncbi.nlm.nih.gov/pubmed?term=Ricca%20V%5BAuthor%5D&cauthor=true&cauthor_uid=25038905), [Rotella CM](http://www.ncbi.nlm.nih.gov/pubmed?term=Rotella%20CM%5BAuthor%5D&cauthor=true&cauthor_uid=25038905), [Mannucci E](http://www.ncbi.nlm.nih.gov/pubmed?term=Mannucci%20E%5BAuthor%5D&cauthor=true&cauthor_uid=25038905). All roads bring to Rome: a different way for predicting success in the therapy of obesity through psychological features. *J Endocrinol Invest* 2014 [PMID: 25038905]

32 **Cresci B**, Castellini G, Pala L, Bigiarini M, Romoli E, Poggiali R, Guarnieri C, Biffi B, La Ferlita T, Ricca V, Mannucci E, Rotella CM. Fit and motivated: outcome predictors in patients starting a program for lifestyle change. *Obes Facts* 2013; **6**: 279-287 [PMID: 23797235 DOI: 10.1159/000353433]

33 **Brennan L**, Walkley J, Fraser SF, Greenway K, Wilks R. Motivational interviewing and cognitive behaviour therapy in the treatment of adolescent overweight and obesity: study design and methodology. *Contemp Clin Trials* 2008; **29**: 359-375 [PMID: 17950046]

34 **Armstrong MJ**, Mottershead TA, Ronksley PE, Sigal RJ, Campbell TS, Hemmelgarn BR. Motivational interviewing to improve weight loss in overweight and/or obese patients: a systematic review and meta-analysis of randomized controlled trials. *Obes Rev* 2011; **12**: 709-723 [PMID: 21692966 DOI: 10.1111/j.1467-789X.2011.00892.x]

35 **Bandura A**. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev* 1977; **84**: 191-215 [PMID: 847061]

36 **Bandura A.** Social learning theory. Englewood Cliffs, New Jersey: Prentice-Hall, 1977

37 **Schwarzer R,** Jerusalem M. Measurement of perceived self-efficacy: Psychometric scales for cross-cultural research. Berlin: Freie Universität Berlin, Institut for psychologie, 1993

38 **Glynn SM,** Ruderman AJ. The development and validation of an eating self-efficacy scale. *Cognitive Ther Res* 1986; **10**: 403–420 Available from: URL: http://link.springer.com/article/10.1007%2FBF01173294

39 **Clark MM**, Abrams DB, Niaura RS, Eaton CA, Rossi JS. Self-efficacy in weight management. *J Consult Clin Psychol* 1991; **59**: 739-744 [PMID: 1955608]

40 **Jeffery RW**, Bjornson-Benson WM, Rosenthal BS, Lindquist RA, Kurth CL, Johnson SL. Correlates of weight loss and its maintenance over two years of follow-up among middle-aged men. *Prev Med* 1984; **13**: 155-168 [PMID: 6739444]

41 **Bernier M,** Avard J. Self-efficacy, outcome and attrition in a weight-reduction program. *Cognitive Ther Res* 1986; **10:** 319–338 Available from: URL: http://link.springer.com/article/10.1007%2FBF01173469#page-1

42 **Prochaska JO**, Norcross JC, Fowler JL, Follick MJ, Abrams DB. Attendance and outcome in a work site weight control program: processes and stages of change as process and predictor variables. *Addict Behav* 1992; **17**: 35-45 [PMID: 1595424]

43 **Bas M**, Donmez S. Self-efficacy and restrained eating in relation to weight loss among overweight men and women in Turkey. *Appetite* 2009; **52**: 209-216 [PMID: 18929608 DOI: 10.1016/j.appet.2008.09.017]

44 **Wamsteker EW**, Geenen R, Iestra J, Larsen JK, Zelissen PM, van Staveren WA. Obesity-related beliefs predict weight loss after an 8-week low-calorie diet. *J Am Diet Assoc* 2005; **105**: 441-444 [PMID: 15746833]

45 **Judge TA,** Locke EA, Durham CC. The dispositional causes of job satisfaction: A core evaluations approach. *Research in Organizational Behavior* 1997; **19:** 151–188

46 **Rotter JB**. Generalized expectancies for internal versus external control of reinforcement. *Psychol Monogr* 1966; **80**: 1-28 [PMID: 5340840]

47 **Wallston KA**, Wallston BS, DeVellis R. Development of the Multidimensional Health Locus of Control (MHLC) Scales. *Health Educ Monogr* 1978; **6**: 160-170 [PMID: 689890]

48 **Stotland S**, Zuroff DC. A new measure of weight locus of control: the Dieting Beliefs Scale. *J Pers Assess* 1990; **54**: 191-203 [PMID: 2313541]

49 **Saltzer EB**. The weight locus of control (WLOC) scale: a specific measure for obesity research. *J Pers Assess* 1982; **46**: 620-628 [PMID: 7161695]

50 **Wallston KA**, Stein MJ, Smith CA. Form C of the MHLC scales: a condition-specific measure of locus of control. *J Pers Assess* 1994; **63**: 534-553 [PMID: 7844739]

51 **Allison DB,** Engel CN. Predicting treatment outcome: why have we been so unsuccessful? In: Allison DA, Pi-Sunyer FX eds. Obesity Treatment: Establishing Goals, Improving Outcomes, and Reviewing the Research Agenda. New York: Plenum Press, 1995: 191–198

52 **Wiltink J**, Dippel A, Szczepanski M, Thiede R, Alt C, Beutel ME. Long-term weight loss maintenance after inpatient psychotherapy of severely obese patients based on a randomized study: predictors and maintaining factors of health behavior. *J Psychosom Res* 2007; **62**: 691-698 [PMID: 17540227]

53 **Nir Z**, Neumann L. Relationship among self-esteem, internal-external locus of control, and weight change after participation in a weight reduction program. *J Clin Psychol* 1995; **51**: 482-490 [PMID: 7593667]

54 **Elfhag K**, Rössner S. Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obes Rev* 2005; **6**: 67-85 [PMID: 15655039]

55 **Testa MA**, Simonson DC. Assesment of quality-of-life outcomes. *N Engl J Med* 1996; **334**: 835-840 [PMID: 8596551]

56 **Ware JE,** Snow KK, Kosinski M, Gandek B. SF-36 Health Survey: Manual and Interpretation Guide. The Health Institute, New England Medical Center: Boston, 1993

57 **Kolotkin RL**, Head S, Hamilton M, Tse CK. Assessing Impact of Weight on Quality of Life. *Obes Res* 1995; **3**: 49-56 [PMID: 7712359]

58 **Kolotkin RL**, Crosby RD, Kosloski KD, Williams GR. Development of a brief measure to assess quality of life in obesity. *Obes Res* 2001; **9**: 102-111 [PMID: 11316344]

59 **Mannucci E**, Ricca V, Barciulli E, Di Bernardo M, Travaglini R, Cabras PL, Rotella CM. Quality of life and overweight: the obesity related well-being (Orwell 97) questionnaire. *Addict Behav* 1999; **24**: 345-357 [PMID: 10400274]

60 **Fontaine KR**, Barofsky I, Andersen RE, Bartlett SJ, Wiersema L, Cheskin LJ, Franckowiak SC. Impact of weight loss on health-related quality of life. *Qual Life Res* 1999; **8**: 275-277 [PMID: 10472159]

61 **Fontaine KR**, Barofsky I, Bartlett SJ, Franckowiak SC, Andersen RE. Weight loss and health-related quality of life: results at 1-year follow-up. *Eat Behav* 2004; **5**: 85-88 [PMID: 15000957]

62 **Kaukua J**, Pekkarinen T, Sane T, Mustajoki P. Health-related quality of life in obese outpatients losing weight with very-low-energy diet and behaviour modification--a 2-y follow-up study. *Int J Obes Relat Metab Disord* 2003; **27**: 1233-1241 [PMID: 14513072]

63 **Teixeira PJ**, Going SB, Houtkooper LB, Cussler EC, Metcalfe LL, Blew RM, Sardinha LB, Lohman TG. Pretreatment predictors of attrition and successful weight management in women. *Int J Obes Relat Metab Disord* 2004; **28**: 1124-1133 [PMID: 15263921]

64 **Coopersmith S**. The antecedents of self-esteem. San Francisco: Freeman, 1967

65 **Rosenberg M.** Society and the Adolescent Self-Image. Princeton, NJ: Princeton University Press, 1965

66 **Erermis S**, Cetin N, Tamar M, Bukusoglu N, Akdeniz F, Goksen D. Is obesity a risk factor for psychopathology among adolescents? *Pediatr Int* 2004; **46**: 296-301 [PMID: 15151546]

67 **Pierce JW**, Wardle J. Cause and effect beliefs and self-esteem of overweight children. *J Child Psychol Psychiatry* 1997; **38**: 645-650 [PMID: 9315974]

68 **Braet C**, Tanghe A, Bode PD, Franckx H, Winckel MV. Inpatient treatment of obese children: a multicomponent programme without stringent calorie restriction. *Eur J Pediatr* 2003; **162**: 391-396 [PMID: 12756560]

69 **Walker LL**, Gately PJ, Bewick BM, Hill AJ. Children's weight-loss camps: psychological benefit or jeopardy? *Int J Obes Relat Metab Disord* 2003; **27**: 748-754 [PMID: 12833121]

70 **Daniali S**, Azadbakht L, Mostafavi F. Relationship between body satisfaction with self esteemand unhealthy body weight management. *J Educ Health Promot* 2013; **2**: 29 [PMID: 24083279 DOI: 10.4103/2277-9531.115804]

71 **Tangney JP**, Baumeister RF, Boone AL. High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *J Pers* 2004; **72**: 271-324 [PMID: 15016066]

72 **Konttinen H**, Haukkala A, Sarlio-Lähteenkorva S, Silventoinen K, Jousilahti P. Eating styles, self-control and obesity indicators. The moderating role of obesity status and dieting history on restrained eating. *Appetite* 2009; **53**: 131-134 [PMID: 19433123 DOI: 10.1016/j.appet.2009.05.001]

73 **Kuijer R**, de Ridder D, Ouwehand C, Houx B, van den Bos R. Dieting as a case of behavioural decision making. Does self-control matter? *Appetite* 2008; **51**: 506-511 [PMID: 18479777 DOI: 10.1016/j.appet.2008.03.014]

74 **Munro IA**, Bore MR, Munro D, Garg ML. Using personality as a predictor of diet induced weight loss and weight management. *Int J Behav Nutr Phys Act* 2011; **8**: 129 [PMID: 22112231 DOI: 10.1186/1479-5868-8-129]

75 **Stunkard AJ**, Messick S. The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *J Psychosom Res* 1985; **29**: 71-83 [PMID: 3981480]

76 **Karlsson J**, Persson LO, Sjöström L, Sullivan M. Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. *Int J Obes Relat Metab Disord* 2000; **24**: 1715-1725 [PMID: 11126230]

77 **Tholin S**, Rasmussen F, Tynelius P, Karlsson J. Genetic and environmental influences on eating behavior: the Swedish Young Male Twins Study. *Am J Clin Nutr* 2005; **81**: 564-569 [PMID: 15755823]

78 **Westerterp-Plantenga MS**, Kempen KP, Saris WH. Determinants of weight maintenance in women after diet-induced weight reduction. *Int J Obes Relat Metab Disord* 1998; **22**: 1-6 [PMID: 9481593]

79 **Lejeune MP**, Van Aggel-Leijssen DP, Van Baak MA, Westerterp-Plantenga MS. Effects of dietary restraint vs exercise during weight maintenance in obese men. *Eur J Clin Nutr* 2003; **57**: 1338-1344 [PMID: 14506498]

80 **Cuntz U**, Leibbrand R, Ehrig C, Shaw R, Fichter MM. Predictors of post-treatment weight reduction after in-patient behavioral therapy. *Int J Obes Relat Metab Disord* 2001; **25** Suppl 1: S99-S101 [PMID: 11466600]

81 **Wing RR**, Hill JO. Successful weight loss maintenance. *Annu Rev Nutr* 2001; **21**: 323-341 [PMID: 11375440]

82 **McGuire MT**, Wing RR, Klem ML, Lang W, Hill JO. What predicts weight regain in a group of successful weight losers? *J Consult Clin Psychol* 1999; **67**: 177-185 [PMID: 10224727]

83 **Karlsson J**, Hallgren P, Kral J, Lindroos AK, Sjöström L, Sullivan M. Predictors and effects of long-term dieting on mental well-being and weight loss in obese women. *Appetite* 1994; **23**: 15-26 [PMID: 7826054]

84 **Björvell H**, Aly A, Langius A, Nordström G. Indicators of changes in weight and eating behaviour in severely obese patients treated in a nursing behavioural program. *Int J Obes Relat Metab Disord* 1994; **18**: 521-525 [PMID: 7951470]

85 **Brytek-Matera A.** Exploring the factors related to body image dissatisfaction in the context of obesity. *Arch Psychiat Psychother* 2011;1: 63–70 Available from: URL: http://www.archivespp.pl/uploads/images/2011\_13\_1/BrytekMatera63\_Archives1\_11.pdf

86 **Dounchis JZ,** Hayden HA, Wilfley DE. Obesity, body image, and eating disorders in ethnically diverse children and adolescents. In: Thompson JK, Smolak L, editors. Body image, eating disorders, and obesity in youth: assessment, prevention, and treatment. Washington, DC: American Psychological Association, 2001: 67–98

87 **Ben-Tovim DI**, Walker MK. The development of the Ben-Tovim Walker Body Attitudes Questionnaire (BAQ), a new measure of women's attitudes towards their own bodies. *Psychol Med* 1991; **21**: 775-784 [PMID: 1946865]

88 **Cooper PJ,** Taylor MJ, Cooper Z, Fairburn CG. The development and validation of a body shape questionnaire. Int J Eat Disord 1987; 6: 485–494

89 **Fox KR.** The Physical Self-Perception Profile Manual. DeKalb: Northern Illinois University, Office of Health Promotion, 1990

90 **Secord PF**, Jourard SM. The appraisal of body-cathexis: body-cathexis and the self. *J Consult Psychol* 1953; **17**: 343-347 [PMID: 13109086]

91 **Slade PD,** Dewey ME, Newton T, Brodie D, Kiemle G. Development of the Body Satisfaction Scale (BSS). *Psychology and Health* 1990; **4:** 213-226

92 **Corning AF**, Gondoli DM, Bucchianeri MM, Salafia EH. Preventing the development of body issues in adolescent girls through intervention with their mothers. *Body Image* 2010; **7**: 289-295 [PMID: 20833596 DOI: 10.1016/j.bodyim.2010.08.001]

93 **Cuzzolaro M,** Vetrone G, Marano G, Battacchi MW. BUT, Body Uneasiness Test: a new attitudinal body image scale. *Psichiatr Infan Adolesc* 1999; **66:** 417–428

94 **Foster GD**, Wadden TA, Vogt RA, Brewer G. What is a reasonable weight loss? Patients' expectations and evaluations of obesity treatment outcomes. *J Consult Clin Psychol* 1997; **65**: 79-85 [PMID: 9103737]

95 **Mond JM**, Rodgers B, Hay PJ, Darby A, Owen C, Baune BT, Kennedy RL. Obesity and impairment in psychosocial functioning in women: the mediating role of eating disorder features. *Obesity (Silver Spring)* 2007; **15**: 2769-2779 [PMID: 18070768]

96 **Myers A**, Rosen JC. Obesity stigmatization and coping: relation to mental health symptoms, body image, and self-esteem. *Int J Obes Relat Metab Disord* 1999; **23**: 221-230 [PMID: 10193866]

97 **Traverso A**, Ravera G, Lagattolla V, Testa S, Adami GF. Weight loss after dieting with behavioral modification for obesity: the predicting efficiency of some psychometric data. *Eat Weight Disord* 2000; **5**: 102-107 [PMID: 10941608]

98 **Schwartz MB**, Brownell KD. Obesity and body image. *Body Image* 2004; **1**: 43-56 [PMID: 18089140]

99 **Byrne S**, Cooper Z, Fairburn C. Weight maintenance and relapse in obesity: a qualitative study. *Int J Obes Relat Metab Disord* 2003; **27**: 955-962 [PMID: 12861237]

100 **Fowler JL**, Follick MJ, Abrams DB, Rickard-Figueroa K. Participant characteristics as predictors of attrition in worksite weight loss. *Addict Behav* 1985; **10**: 445-448 [PMID: 4091079]

101 **Bennett GA**, Jones SE. Dropping out of treatment for obesity. *J Psychosom Res* 1986; **30**: 567-573 [PMID: 3772838]

102 **Dalle Grave R**, Calugi S, Molinari E, Petroni ML, Bondi M, Compare A, Marchesini G. Weight loss expectations in obese patients and treatment attrition: an observational multicenter study. *Obes Res* 2005; **13**: 1961-1969 [PMID: 16339128]

103 **Fabricatore AN**, Wadden TA, Womble LG, Sarwer DB, Berkowitz RI, Foster GD, Brock JR. The role of patients' expectations and goals in the behavioral and pharmacological treatment of obesity. *Int J Obes (Lond)* 2007; **31**: 1739-1745 [PMID: 17471295]

104 **Gorin AA**, Marinilli Pinto A, Tate DF, Raynor HA, Fava JL, Wing RR. Failure to meet weight loss expectations does not impact maintenance in successful weight losers. *Obesity (Silver Spring)* 2007; **15**: 3086-3090 [PMID: 18198318 DOI: 10.1038/oby.2007.367]

105 **Jeffery RW**, Wing RR, Mayer RR. Are smaller weight losses or more achievable weight loss goals better in the long term for obese patients? *J Consult Clin Psychol* 1998; **66**: 641-645 [PMID: 9735580]

106 **Linde JA**, Jeffery RW, Finch EA, Ng DM, Rothman AJ. Are unrealistic weight loss goals associated with outcomes for overweight women? *Obes Res* 2004; **12**: 569-576 [PMID: 15044676]

107 **Cloninger CR**, Svrakic DM, Przybeck TR. A psychobiological model of temperament and character. *Arch Gen Psychiatry* 1993; **50**: 975-990 [PMID: 8250684]

108 **Schalling D,** Edman G. The Karolinska Scales of Personality (KSP) Manual: an inventory for assessing temperament dimensions associated with vulnerability for psychosocial deviance. Stockholm, Sweden: Department of Psychiatry, Karolinska Institutet, 1993

109 **John OP,** Naumann LP, Soto CJ. Paradigm shift to the integrative big-five trait taxonomy: history, measurement, and conceptual issues. In: John OP, Robins RW, Pervin LA eds. Handbook of Personality: Theory and Research. New York: Guilford Press, 2008: 114–158

110 **De Chouly De Lenclave MB**, Florequin C, Bailly D. [Obesity, alexithymia, psychopathology and binge eating: a comparative study of 40 obese patients and 32 controls]. *Encephale* 2001; **27**: 343-350 [PMID: 11686056]

111 **Bagby RM**, Parker JD, Taylor GJ. The twenty-item Toronto Alexithymia Scale--I. Item selection and cross-validation of the factor structure. *J Psychosom Res* 1994; **38**: 23-32 [PMID: 8126686]

112 **Bagby RM**, Taylor GJ, Parker JD. The Twenty-item Toronto Alexithymia Scale--II. Convergent, discriminant, and concurrent validity. *J Psychosom Res* 1994; **38**: 33-40 [PMID: 8126688]

113 **Sullivan S**, Cloninger CR, Przybeck TR, Klein S. Personality characteristics in obesity and relationship with successful weight loss. *Int J Obes* (Lond) 2007; **31**: 669-674 [PMID: 16953251]

114 **De Panfilis C**, Cero S, Dall'Aglio E, Salvatore P, Torre M, Maggini C. Psychopathological predictors of compliance and outcome in weight-loss obesity treatment. *Acta Biomed* 2007; **78**: 22-28 [PMID: 17687813]

115 **Jokela M**, Hintsanen M, Hakulinen C, Batty GD, Nabi H, Singh-Manoux A, Kivimäki M. Association of personality with the development and persistence of obesity: a meta-analysis based on individual-participant data. *Obes Rev* 2013; **14**: 315-323 [PMID: 23176713 DOI: 10.1111/obr.12007]

116 **Costa PT,** McCrae RR. Revised NEO Personality lnventory(NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual. Odessa, FL: Psychological Assessment Resources Inc., 1992

117 **Elfhag K**, Finer N, Rössner S. Who will lose weight on sibutramine and orlistat? Psychological correlates for treatment success. *Diabetes Obes Metab* 2008; **10**: 498-505 [PMID: 17593239]

**P-Reviewer:** Ji G, Richardson WS, Tangtrakulwanich B **S-Editor:** Ji FF **L-Editor: E-Editor:**

**Table1 Summary of the test most commonly used in the evaluation of psychological condition.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Areas of evaluation** | **Uses** | **Domains/subscales** | **NO.****of items** | **Limits** |
| **Self Motivation Inventory**[26] | Self motivation | Community samples, clinical populations | Tendency to persevere, ﬁnish tasks initiated, maintain self-discipline, motivate oneself | 40 | Not specific for obese subjects Assesses only the trait-like construct of self-motivationDoes not include specific items to investigate expectations about health or weight |
| **General Self-Efficacy Scale**[37] | General self-efficacy | Community samples, clinical populations |  | 10 | Not specific for obese subjects |
| **Eating Self-Efficacy Scale**[38] | Perceived control over food consumption | Dieting and/oroverweight individuals | Twodimensions of efﬁcacy to control overeating: negative affect, socially acceptable circumstances | 25 | - |
| **Weight Efficacy Life-Style Questionnaire**[39] | Self-efficacy in weight management | Patients with obesity | Five dimensions ofefﬁcacy for weight management: negative emotions, availability, social pressure, physical discomfort, positive activities | 20 | Neither the total, nor the five subscales scores were associated with either program attendance or weight loss[57] |
| **Internal-External Scale**[46] | Locus of control beliefs | Community samples, clinical populations | - | 23 | Not specific for obese subjects Does not include specific items to investigate expectations about health or weight |
| **Multidimensional Health Locus Of Control Scale**[47] | Locus of control in relation to specific health conditions and behaviors | Community samples, clinical populations | Internality, chance externality, powerful others externality | 18 | Not specific for obese subjectsDoes not include specific items to investigate expectations about health or weightIndividuals could no longer be classified as “internals” or “externals” (compared to other questionnaires evaluating locus of control) |
| **Dieting Beliefs Scale**[48] | Locus of control with respect to personal weight | Dietingindividuals | - | 16 | - |
| **Weight Locus Of Control Scale**[49] | Locus of control with respect to personal weight | Dietingindividuals | - | 4 | - |
| **Medical Outcomes Study: Short Form-36**[56] | Health-related quality of life | Clinical populations | Physical function, role limitations (physical), vitality, general health perceptions,bodily pain, social function, role limitations(emotional), mental health | 36 | Not specific for obese subjectsDoes not measure disease-specific domains Lacks in sensitivity to detect small treatment effects It is recommended that it be used in conjunction with an obesity specific questionnaire[56]Does not include specific items to investigate expectations about weightConsiders all individual psychological symptoms equally relevant in the determination of the patients’ well-being |
| **Impact Of Weight On Quality Of Life Questionnaire**[57] | Health-related quality of life | Patients with obesity | Health,social/interpersonal life, work, mobility, self-esteem, sexual life, daily activities, living, comfort with food | 74 | Considers all individual psychological symptoms equally relevant in the determination of the patients’ well-being |
| **Impact Of Weight On Quality Of Life Questionnaire-Lite**[58] | Health-related quality of life | Psychiatric patients, patients with obesity | Physical Function, self-esteem, sexual life,public distress, work | 31 | Considers all individual psychological symptoms equally relevant in the determination of the patients’ well-being |
| **Obesity Related Well-Being (ORWELL 97) Questionnaire**[59] | Health-related quality of life | Patients with obesity | Perceived psychological status and social adjustment, physical symptoms and impairment | 18 | Weaknesses were found when trying to correlate Body Mass Index with sub-scores of the questionnaire |
| **Rosenberg Self-Esteem Scale**[65] | Global self-esteem | Community samples, clinical populations | - | 10 | Not specific for obese subjectsDoes not include specific items to investigate expectations about health or weightMeasures global self-esteem and not the sub-domains of self-esteem |
| **Tangney Self Control Scale**[71] | General self-control | Community samples, clinical populations |  | 36 | Not specific for obese subjects |
| **Three-Factor Eating Questionnaire-R18,-R21**[76,77] | Domains of eatingbehavior | Community samples, obese individuals | Cognitive restraint, uncontrolled eating, and emotional eating | 18;21 |  |
| **Body Attitude Questionnaire**[87] | Body attitudes | Patients with eating disorders | Feelings of overall fatness, self-disparagement, strength, salience of weight, feelings of attractiveness, consciousness of lower body fat | 44 | Not specific for obese subjectsOriginally developed only for women |
| **Body Shape Questionnaire**[88] | Concernsaboutbody shape and‘feeling fat’ | Community samples, patients with eating disorder | - | 34 | Originally developed for use in Anorexia Nervosa and Bulimia NervosaNot appropriate for assessing body dissatisfaction in males |
| **Physical Self-Perception Profile**[89] | Self-evaluations in thephysical domain | Community samples, clinical populations | Sport competence, perception of physical condition and fitness, perception of an attractive body, perception of physical strength, physical self-worth | 30 | Not specific for obese subjects |
| **Body Cathexis Questionnaire**[90] | Body dissatisfaction | Community samples, clinical populations | - | 46 | Not specific for obese subjects |
| **Body Satisfaction Scale**[91] | Body dissatisfaction | Community samples, patients with eating disorder, overweight subjects | - | 16 | Not specific for obese subjects |
| **Body Parts Dissatisfaction Scale**[92] | Body dissatisfaction | Community samples, clinical populations | Parts wished were smaller, parts wished were bigger, parts with which content | 7 | Developed for use in adolescents girls |
| **Goals And Relative Weights Questionnaire**[94] | Factors that influence selection of a weight goal, weight loss goals as “dream weight”, “happy weight”, “acceptable weight”, “disappointed weight” | Overweight and obese patients | - |  | - |
| **Temperament And Character Inventory**[107] | Normal and abnormal personality traits | Community samples, clinical populations | Novelty seeking, harm avoidance, reward dependence, persistence, self-directedness, cooperativeness, self-transcendence | 240 | Not specific for obese subjects |
| **Karolinska Scales Of Personality**[108] | Personality traits associated withvulnerability for psychological deviance | Patientswith various psychiatric and psychosomatic disorders | Guilt, indirect aggression, irritability, suspiciousness, verbal aggression, inhibition of aggression, muscolar tension, psychasthenia, psychic anxiety, somatic anxiety, socialization, social desirability, detachment, impulsiveness, monotony avoidance | 135 | Not specific for obese subjectsDesigned to evaluate abnormal personality, rather than variations of normal personality  |
| **Toronto Alexithymia Scale-20**[111,112] | Alexithymia | Community samples, clinical populations | Difficulty describing feelings, difficulty identifying feeling, externally-oriented thinking | 20 | Not specific for obese subjects |
| **Revised Neo Personality Lnventory**[116] | Five broad personality domains | Community samples, clinical populations | Extraversion, neuroticism, agreeableness, conscientiousness and openness to experience; six specific facet scales in each of five broad domains  | 240 | Not specific for obese subjects |