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ORIGINAL PAPER

A Measure of Dysfunctional Eating-Related Cognitions in People with Psychotic Disorders

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Abstract Obesity and binge eating disorder are common in individuals with psychotic disorders. Eating and weight-related cognitions are known to influence eating behaviors. The study was designed to assess the psychometric properties of the Mizes Anorectic Cognitions Questionnaire (MAC-R) in patients with psychotic disorders. Binge eating disorder (BED), body mass index (BMI), the MAC-R and the three factor eating questionnaire (TFEQ) were assessed in 125 patients with a diagnosis of schizophrenia or schizoaffective disorder. Whereas the MAC-R has not acceptable psychometric properties, a brief version of the MAC-R (BMAC) has good psychometrical properties and is correlated with TFEQ and BMI. Binge eating disorder is also correlated to the Rigid Weight Regulation and Fear of Weight Gain subscale. The BMAC is a useful brief measure to assess eating and weight related cognitions in people with psychotic disorders.

Keywords Antipsychotic drugs · Weight gain · Obesity · Binge eating disorder · Mizes anorectic cognitions · Factor structure

Introduction

Overweight and obesity are common in individuals with schizophrenia [1, 2] and are linked to antipsychotic drugs (AP) [3]. AP induced weight gain is related to an increase in global caloric intake possibly associated to alterations of the feeling of satiety [4] and possible alterations of peripheral metabolism signals [5].

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Cognitive-behavioral conceptualizations on eating-disorders and obesity highlighted the role of dysfunctional cognitions (i.e. restraint: the intention to consciously restrict food intake in order to maintain body weight or to promote weight loss) [6] in clinical and non-clinical populations without psychotic disorders [7–10]. These cognitions were associated with overeating under different conditions including an exposition to food preload, foods-related cues, alcohol and dysphoric moods [10–12]. Levels of eating disorder cognitions have been shown to persist following a moderate calorie restricted diet [13] and predict post treatment relapse [8]. In addition, several studies showed a correlation between dietary restrained eating and binge eating disorder (BED) [7], which is associated with obesity [9, 14].

These cognitions, assessed with the revised Mizes Anorectic Cognitive Questionnaire (MAC-R) [15], were also found in overweight patients treated with antipsychotic drugs [16].

In populations without psychotic disorders, the MAC-R [15] has been showed to be a relevant self-report to assess cognitions related to eating disorders. This questionnaire was correlated with other eating disorder questionnaires such as the Eating Disorders Inventory [17] and the Restraint scale [18]. However, the psychometrical properties of the MAC-R remain unclear. Indeed, a previous study [19] fails to confirm the factor structure of the MAC-R on an undergraduate sample and had secondly extracted a brief 12-items version of this questionnaire (Brief Mizes Anorectic questionnaire: BMAC).

The MAC-R was already used among people with psychotic disorders and it was furthermore found that a cognitive and behavioral treatment including interventions aiming to change these cognitions was effective in this population [20].

The study aims to investigate the psychometric properties of the MAC-R in people with psychotic disorders which has not yet been realized despite the clinical relevance of this instrument.

Methods

Participants and Procedure

Participants were recruited in outpatient and day hospital units in Lausanne, Switzerland. Inclusion criteria were a DSM-IV diagnosis of schizophrenia or schizoaffective disorder. Exclusion criteria were opiate, alcohol or cocaine dependence and impossibility to give written informed consent. Psychiatric diagnoses were established according to the DSM-IV criteria by psychiatry residents and a senior psychiatrist, based on clinical interviews. The present study is part of a study approved by the Lausanne Ethical committee. All patients gave written informed consent.

Measures

The participants were assessed with the instruments described below.

The Revised Mizes Anorectic Cognitive Questionnaire (MAC-R)

The French MAC-R consisted of 24 items translated from the English into French and then back-translated by an independent English-French bilingual. All discrepancies identified

were discussed until a satisfactory solution was found. The MAC-R assess three specific dimensions: (1) Rigid Weight regulation and Fear of Weight gain (RWFW), (2) Self-Control as the basis of Self-Esteem (SCSE), and (3) Weight and eating behavior as the basis of Approval From Others (WAFO). Participants responded to each item using a Likert-scale ranging from 1 = “Strongly disagree” to 5 = “Strongly agree”.

Three Factor Eating Questionnaire (TFEQ)

The TFEQ [21] is a widely used 51 item self-report questionnaire (with a true–false response format) intended to assess three dimensions of eating behaviors: “Restraint”, “Disinhibition” (susceptibility to periodic disinhibition of control over eating) and perceived “Hunger”.

Dietary restraint as measured by TFEQ reflects behavioral mechanisms for restraining food intake which differs from the cognitive restraint dimension (the *intention* to consciously restrict food intake) of the MAC-R [21].

Eating Disorders

Bulimia nervosa, anorexia and BED were assessed through a clinical interview using DSM-IV criteria (SCID-IV) [22].

Body Mass Index (BMI)

Height and body weight were measured, BMI was then calculated.

Results

Participants

One participant with a bulimia nervosa was excluded from the analysis. In fine, (40 day-hospital patients and 85 outpatients) 125 subjects (30.5% with a BED) were included in the study (Table 1). Table 1 reports demographical characteristics, diagnosis, BMI, and anti-psychotic drug medication of the sample. Due to its longer format, the TFEQ was available for only 55 patients. The other measures, with the exception of few missing data, were available for the whole sample.

Confirmatory Factor Analysis of the MAC-R

The psychometric properties of the MAC-R were analyzed using Confirmatory Factor Analysis (CFA) computed with Mplus [23], using the Full-Information Maximum Likelihood (FIML) estimator for missing data (12 patients have one or more missing data on the MAC-R). To evaluate the overall fit of each model to the data, we used the Mplus MLR chi-square test of model fit that is robust to non-normal data. In addition to the chi-square, three classical fit indices which depend on conventional cut-off were used: The Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), and the Comparative Fit Index (CFI). Hu and Bentler [24] recommended values of RMSEA below .06, SRMR below .08, and CFI above .95. Two models were then

Table 1 Baseline characteristics of the sample

	Group total (<i>N</i> = 125)
Age	35.7 years (SD 10.9)
Gender (%)	57.6% women
Living in a residential setting	19%
Unemployed (%)	78.5%
Time since first contact with psychiatric services	8.6 years (SD 6.2)
Binge eating disorder	30.5%
Body mass index, mean (SD)	29.7 (SD 5.3)
MAC-R total score	72.6 (SD 12.5)
Diagnosis	
Schizophrenia	93.8%
Schizoaffective disorders	6.2%
Antipsychotic drugs (%) (one or more drugs per patient)	
Olanzapine	38.5%
Risperidone	16%
Clozapine	13.2%
Quetiapine	14%
Aripiprazole	13.2%
Amisulpride	5.3%
Classical antipsychotic	12%

computed: (1) a model based on the original three factor model of the MAC-R (Model 1A); and (2) a model assessing the fit of a unique latent variable composed of all the items of the MAC-R (Model 1B). Results showed that the two models computed have a poor fit. Then, we chose to compute another model (Model B) based on a study of Osman et al. [19]. Indeed, these authors also failed to validate the MAC-R and have validated a short three-factor model of this questionnaire based on 12 items: The BMAC. Results showed Model C has a good fit (Table 2). Internal reliability (Cronbach's alpha) of the BMAC range from relatively poor (SCSE: $\alpha = .54$; RFWF: $\alpha = .55$) to acceptable (WAFO: $\alpha = .63$). However, the internal reliability of the whole scale is acceptable ($\alpha = .65$).

Correlation Analysis

Means, standard deviations, and Cronbach's alpha for the BMAC, the TFEQ, and the BMI are reported in Table 3 for participants with no missing data.

Table 2 Fit indices of the confirmatory factor analyses

Model	χ^2	df	RMSEA	SRMR	CFI
Model 1A (MAC-R 1 factor)	559.74***	252	.10	.11	.35
Model 2A (MAC-R 3 factors)	427.44***	249	.076	.10	.62
Model B (BMAC)	62.54	51	.043	.075	.92

*** $P < .001$

Table 3 Descriptive statistics

	α	Females ($N = 72$)		Males ($N = 53$)	
		M	SD	M	SD
BMAC	.65	37.68	6.84	35.06	7.68
BMAC–SCSE	.54	15.48	3.31	13.79	3.50
BMAC–WAFO	.63	10.62	3.54	9.73	2.94
BMAC–RWWF	.55	11.48	3.89	11.75	3.84
TFEQ	.71	27.75	6.55	23.77	6.16
TFEQ–Restraint	.80	11.79	4.28	8.33	4.68
TFEQ–Disinhibition	.62	8.93	3.35	7.97	2.71
TFEQ–Hunger	.68	7.04	3.14	7.47	2.89
BMI		29.92	5.58	29.49	4.79

α Cronbach's alpha; *M* mean; *SD* standard deviation; *BMAC* total score on the Brief Mizes Anorectic Cognitions Questionnaire; *BMAC–SCSE* BMAC–Self-Control and Self-Esteem; *BMAC–WAFO* BMAC–Weight and Approval from Others; *BMAC–RWWF* BMAC–Rigid Weight Regulation and Fear of Weight Gain; *TFEQ* total score on the Three-Factor Eating Questionnaire; *BMI* body mass index

Correlation analysis was computed to explore the relationship between the BMAC and the TFEQ, BMI, gender, and the presence of a BED. Pairwise treatment of missing data was used. Confirming or rejecting hypotheses based on *P*-value has been shown to be problematic because *P*-value depends on both effect sizes and sample size. Thus, following suggestions by several authors [25], effect sizes were reported within 95% confident interval (CI) and used in the interpretation of the results. The relationships between gender and the occurrence of binge eating with the other variables were considered by computing Pearson's point-biserial correlation (r_{pb}) for dichotomic variables. All correlations are reported in Table 4. In particular, significant correlations appeared between the BMAC total score and the TFEQ total score (.35), the Hunger dimension of the TFEQ (.34), and the BMI (.35). Considering the subscales of the BMAC, correlations were found between the SCSE facet of the BMAC and both the total score of the TFEQ (.36) and the Restraint facet of the TFEQ (.38), whereas the RWWF facet of the BMAC was related to the Hunger dimension of the TFEQ (.34). In addition, BMI was positively related to both the SCSE (.34) and the RWWF (.27) facets of the BMAC. Considering gender differences, results showed that female have higher scores on the SCSE facet of the BMAC (.24). Finally, the RWWF facet of the BMAC is related to the occurrence of a diagnosis of binge eating disorder (.23).

Discussion

The aim of the present study was to validate the MAC-R in a French speaking sample of patients with psychotic disorder. Similarly as in the study of Osman et al. [19], we failed to confirm a one factor as well as a three factors model of the MAC-R. However, based on findings of Osman et al. [19], we showed that the BMAC (12 items which correspond to the three-factor model of the original MAC-R) has good psychometrical properties. Nevertheless, although the whole scale has an acceptable internal reliability, two of its subscales have lower internal reliability. These results could be due to the low number of items in the BMAC subscales and to a moderate sample size including variability in BED diagnosis.

Table 4 Pearson correlations (within their 95% CI)

	BMAC	BMAC–SCSE	BMAC–WAFO	BMAC–RFWF
BMAC–SCSE	.69 ^a (.57, .77) N = 113			
BMAC–WAFO	.62 ^a (.50, .72) N = 113	.15 (–.04, .32) N = 118		
BMAC–RFWF	.73 ^a (.64, .81) N = 113	.27 ^a (.10, .43) N = 116	.17 (–.01, .37) N = 115	
TFEQ	.35 ^a (.08, .57) N = 54	.36 ^a (.10, .57) N = 55	.24 (–.03, .47) N = 55	.22 (–.05, .46) N = 54
TFEQ-Restraint	.22 (–.07, .47) N = 54	.38 ^a (.13, .59) N = 55	.15 (–.12, .40) N = 55	–.03 (–.29, .25) N = 54
TFEQ-Disinhibition	.14 (–.15, .40) N = 54	–.01 (–.27, .26) N = 55	.09 (–.18, .35) N = 55	.19 (–.08, .44) N = 54
TFEQ-Hunger	.34 ^a (.07, .56) N = 54	.21 (–.06, .49) N = 55	.20 (–.07, .44) N = 55	.34 ^a (.08, .56) N = 54
Gender ^b	–.18 (–.35, .00) N = 118	–.24 ^a (–.40, –.07) N = 121	–.13 (–.31, .05) N = 120	.04 (–.15, .21) N = 118
BMI	.31 ^a (.13, .47) N = 118	.34 ^a (.17, .49) N = 121	.02 (–.16, .20) N = 120	.27 ^a (.09, .43) N = 118
Binge eating ^b	.14 (–.05, .32) N = 118	.05 (–.13, .23) N = 121	–.05 (–.23, .13) N = 120	.23 ^a (.05, .39) N = 118

N = sample size for each correlation. Pairwise treatment of missing data

BMAC total score on the Brief Mizes Anorectic Cognitions Questionnaire; BMAC–SCSE BMAC–Self-Control and Self-Esteem; BMAC–WAFO BMAC–Weight and Approval from Others; BMAC–RFWF BMAC–Rigid Weight Regulation and Fear of Weight Gain; TFEQ total score on the Three-Factor Eating Questionnaire; BMI body mass index; Binge eating diagnostic of binge eating disorders

^a 0 not included in the 95% confidence interval

^b Pearson's point-biserial correlation (r_{pb})

The BMAC was correlated to the total score and the Hunger dimension of the TFEQ. This latter is also correlated with the BMAC–RFWF subscale. This relationship may support the assumption that people who scored higher on BMAC–RFWF subscale were at an increasing risk of heavy hunger perception (linked to diet-related behavior). It is also possible that people with more hunger perception (possibly associated to AP) are at risk to develop these cognitions. Interestingly, the BMAC–RFWF subscale was also associated with BED.

Furthermore, as previously found in a population with psychotic disorder, the BMAC was also correlated to the BMI [16], highlighting the possible interest of the BMAC in this population in consideration that change in cognitions may enhance weight loss and lower BED [20]. Further studies documenting the scale's sensitivity to changes in body weight and eating behaviors are warranted.

Conclusion

In conclusion, the BMAC has acceptable psychometrical characteristics in people with psychotic disorders. The BMAC should be a useful tool in clinical practice in this population.

References

1. Allison DB, Fontaine KR, Heo M, et al.: The distribution of body mass index among individuals with and without schizophrenia. *Journal of Clinical Psychiatry* 60(4):215–220, 1999
2. Faulkner G, Cohn T, Remington G: Interventions to reduce weight gain in schizophrenia. *Schizophrenia Bulletin* 33(3):654–656, 2007
3. Covell NH, Weissman EM, Essock SM: Weight gain with clozapine compared to first generation antipsychotic medications. *Schizophrenia Bulletin* 30(2):229–240, 2004
4. Khazaal Y, Chatton A, Claeys F, et al.: Antipsychotic drug and body weight set-point. *Physiology & Behavior* 95(1–2):157–160, 2008
5. Sentissi O, Epelbaum J, Olie JP, et al.: Leptin and ghrelin levels in patients with schizophrenia during different antipsychotics treatment: A review. *Schizophrenia Bulletin* 34(6):1189–1199, 2008
6. Polivy J, Heatherton TF, Herman CP: Self-esteem, restraint, and eating behavior. *Journal of Abnormal Psychology* 97(3):354–356, 1988
7. Polivy J, Herman CP: Dieting and bingeing. A causal analysis. *American Psychologist* 40(2):193–201, 1985
8. Fairburn CG, Peveler RC, Jones R, et al.: Predictors of 12-month outcome in bulimia nervosa and the influence of attitudes to shape and weight. *Journal of Consulting and Clinical Psychology* 61(4):696–698, 1993
9. Cargill BR, Clark MM, Pera V, et al.: Binge eating, body image, depression, and self-efficacy in an obese clinical population. *Obesity Research* 7(4):379–386, 1999
10. Westenhoefer J: Dietary restraint and disinhibition: is restraint a homogeneous construct? *Appetite* 16(1):45–55, 1991
11. Ruderman AJ: Dietary restraint: A theoretical and empirical review. *Psychological Bulletin* 99(2):247–262, 1986
12. Fedoroff I, Polivy J, Herman CP: The specificity of restrained versus unrestrained eaters' responses to food cues: General desire to eat, or craving for the cued food? *Appetite* 41(1):7–13, 2003
13. Khazaal Y, Revaz R, Rothen S, et al.: Persistence of anorectic cognitions following a moderate calorie restricted diet. *Eat Weight Disorders* 11(1):e27–e29, 2006
14. Hsu LK, Mulliken B, McDonagh B, et al.: Binge eating disorder in extreme obesity. *International Journal of Obesity and Related Metabolic Disorders* 26(10):1398–1403, 2002
15. Mizes JS, Christiano B, Madison J, et al.: Development of the mizes anorectic cognitions questionnaire-revised: psychometric properties and factor structure in a large sample of eating disorder patients. *The International Journal of Eating Disorders* 28(4):415–421, 2000
16. Khazaal Y, Fresard E, Zimmermann G, et al.: Eating and weight related cognitions in people with Schizophrenia: A case control study. *Clinical Practice and Epidemiology in Mental Health* 2:29, 2006
17. Garner DM, Olmsted MP: Scoring the eating disorder inventory. *American Journal of Psychiatry* 143(5):680–681, 1986
18. Laessle RG, Tuschl RJ, Kotthaus BC, et al.: A comparison of the validity of three scales for the assessment of dietary restraint. *Journal of Abnormal Psychology* 98(4):504–507, 1989
19. Osman A, Chiros CE, Gutierrez PM, et al.: Factor structure and psychometric properties of the brief Mizes Anorectic Cognitions questionnaire. *Journal of Clinical Psychology* 57(6):785–799, 2001
20. Khazaal Y, Fresard E, Rabia S, et al.: Cognitive behavioural therapy for weight gain associated with antipsychotic drugs. *Schizophrenia Research* 91(1–3):169–177, 2007
21. Stunkard AJ, Messick S: The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research* 29(1):71–83, 1985
22. First MB, Spitzer R, Gibbon M, William J: Structured Clinical Interview for DSM-IV-TR Axis I Disorders-Non Patient Edition. New York, New York State Psychiatric Institute, 2001
23. Muthen LK, Muthen BO: Mplus User's Guide, 4th edn. Los Angeles, Muthen & Muthen, 2006
24. Hu LT, Bentler, PM: Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling* 6:1–55, 1999
25. Schmidt FL: Statistical significance testing and cumulative knowledge in psychology: Implications for training of researchers. *Psychological Methods* 1:115–129, 1996

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