Research Article

Subtyping Women According to Eating Behavior: A Cluster Analysis to Refine the Psychopathological Correlates of Restrained, Emotional and External Eating - ∂

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ABSTRACT

Intriguingly, research is scarce regarding eating pattern-based typology of women from the general population. A sample of 1107 women (Mean age = 34.94 ± 11.5) completed questionnaires assessing eating patterns, body image satisfaction, drive for thinness, and factors related to psychological well-being (self-esteem, flexibility, anxiety and depression symptoms). Based on the Dutch Eating Behavior Questionnaire, a cluster analysis generated three profiles: A "High Restrained" group with elevated levels of the restrained dimension and lower scores of emotional and external behaviors; a "High Emotional and External" cluster with elevated scores for these two behaviors and lower score of the restrained pattern; a third cluster ("Low") with lower scores of all eating behaviors. The "High Restrained" cluster, compared with "Low", showed higher body image dissatisfaction, enhanced drive for thinness, increased anxiety and lower self-esteem and psychological flexibility. The "High Emotional and External" cluster showed even greater signs of unhealthy mental status, with scores for the above variables and for depressive symptoms significantly "unhealthier" than the "High Restrained" cluster. The findings revealed that women with eating styles characterized by "High restrained" or "Highly Emotional and External" are associated with significantly lower mental health status, which refines the psychopathological correlates of these eating patterns.

Keywords: Eating behavior; Emotional eating; Body image; Self-esteem; Cluster analysis

INTRODUCTION

Subtyping women according to eating behavior

A cluster analysis to refine the psychopathological correlates of restrained, emotional and external eating. Susceptibility to weight gain and overweight can be understood at various levels ranging from genetic and physiological to psychological. At the psychological level of food intake, three main concepts exist about the etiology of overeating, each focusing on one type of eating behavior: psychosomatic (emotional), externality and restraint [1].

The psychosomatic type focuses on emotional eating, i.e., eating in response to emotional arousal states including anger, fear or anxiety. Emotional eating is thus considered as an atypical response to distress since emotional arousal is normally associated with biological responses, including hyperactivation of the hypothalamic-pituitary axis, that are designed to prepare for a fight or flight reaction, thereby suppressing hunger. Considering that undereating and weight loss are typical and evolutionary adaptive responses to distress, it has been suggested that the unnatural response of emotional eating is an acquired behavior, possibly as a result of adverse events early in life [2,3]. On the other hand, chronic life stress seems to be associated with a greater preference for energy and nutrient dense foods or stronger drive to eat, and longitudinal studies suggested that chronic life stress may be causally linked to weight gain [4].

The externality style postulates that overeating is relatively unresponsive to internal physiological signals, similarly to the psychosomatic type. However, externality focuses on the external environment as a determinant of eating behavior, while the psychosomatic style emphasizes the role of internal emotional factors. External eaters eat in response to environmental food cues, such as the sight and smell of food. Another contrast with emotional eating is that externality is considered as an evolutionary adaptive response, related to the thrifty genotype concept [5]. This model suggests that evolution has favored genetic adaptations allowing humans to survive during periods of food shortages, including the ability to overeat in times of food abundance and rapidly develop fat on their bodies. Thus, external eating may be a general characteristic of humans, and not specific to overweight people [1].

The restraint type attributes overeating to dieting. This paradox is based on the concept of natural weight, a range of body weight that is homeostatically preserved by the individual. Attempts to lower body weight by the conscious restriction of food intake initiates physiological defenses, such as lowering the metabolic rate and the arousal of persistent hunger. When self-control is destabilized by disinhibitors, such as alcohol, anxiety, depression or even the consumption of high-energy foods, the cognitive resolve to follow a diet may easily be abandoned [6]. Counter regulation may then occur, resulting in excessive food intake. Thus, intense dieting may ultimately result in overeating patterns (that is, emotional or external eating), since both arousal and external stimuli disrupt the cognitive restraint normally exercised by dieters faced with persistent hunger [7].

This current study aimed at identifying a typology based on eating behaviors, using a classification method rather than a factorial/correlational approach. Indeed the variable-centered approach may underestimate the heterogeneity of individuals and proposes general findings and theoretical elaborations that might be somewhat artificial and inaccurate, as they result from the examination of samples combining dissimilar and disparate groups of individuals. In contrast, the person-centered approach, unraveling homogeneous groups of individuals, may reveal group-specific relations between variables that are obscured or masked by a globalizing variable-centered approach [8]. It is also important to note that cluster analyses are useful for determining the presence of subgroups of individuals with specific profiles. In addition, these analyses are valuable for assessing whether these subgroups are varying in frequencies of behaviors and/or symptoms. A comprehensive review article made an inventory of studies involving cluster analysis of dietary patterns, i.e., foods as they are actually consumed in various characteristic combinations [9]. However, research is scarce regarding classification studies based on eating behavior of women from the general population. In a recent pilot study Bouhlal, et al. [10] demonstrated the feasibility of identifying robust eating clusters or phenotypes. In addition, a cluster analysis of eating behaviors in Portuguese higher education students revealed three major eating styles, characterized by either high emotional, external and binge eating, high eating self-efficacy, or high dietary restraint [11].

This study thus aimed at characterizing, using cluster analysis, a typology of women from the general population based on three styles of eating behaviors. We expected to obtain clusters significantly differing from each other in terms of eating patterns, and we hypothesized that these clusters could be also differentiated on other variables, thereby validating the subtyping scheme produced by the cluster analysis. The variables measured included factors related to eating behavior (body image satisfaction, drive for thinness and self-reported BMI) and assessment of psychological well-being markers,

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illustrated by self-esteem, psychological flexibility and general psychopathology (anxiety and depressive symptoms).

METHOD

Participants

Potential participants (women aged between 18 and 65) were invited, through social networks, to participate in a study exploring their behaviors and life habits. They were provided with a link to the online version of the questionnaire. Participants were informed that answers to the questionnaires would remain confidential. Informed consent was obtained from all participants. No compensation was offered to participate in the study, following a standard procedure of the institution. Personal information was gathered, including age, marital status, and educational level. Participants were also asked to indicate their weight and height. Self-reported BMI was calculated as weight in kg divided by the square of height in m.

Measures

Eating behavior patterns: Eating behavior patterns were assessed using the Dutch Eating Behavior Questionnaire (DEBQ) under its French version [12,13]. It contains 33 items (e.g., "Do you have a desire to eat when you have nothing to do?") rated from 1 = never to 5 = very often. Each item is allocated to one of the three following eating pattern: Restrained (10 items), Emotional (13 items) and External (10 items). The score of each dimension is the sum of the individual scores of each relevant items divided by the number of items in the dimension. Higher scores indicate higher occurrences of the respective pattern.

Body image dissatisfaction: Concern about body shape was measured using a French translation of the figure rating scale [14] which presents 9 female schematic silhouettes, ranging from very thin (= 1) to very obese (= 9). Each participant was asked to select the silhouette that best indicates her current body size and the silhouette that reflects her ideal body size. The final score was calculated by subtracting the score of "ideal body size" from that of "current body size". A final score higher than 0 indicates body image disturbance.

Drive for thinness: This was assessed using the relevant subscale of the Eating Disorder Inventory-2 [15] under its French version [16]. It is composed of 7 items (e.g., "I feel extremely guilty after overeating") scored as follows: Never, rarely, sometimes = 0, often = 1, usually = 2, always = 3. A higher score indicates a higher drive for thinness.

Self-esteem: Self-esteem was measured using the French version of Rosenberg's Self-Esteem Scale [17]. It contains 10 items (e.g., "On the whole, I am satisfied with myself.") rated from 1 (strongly disagree) to 4 (strongly agree). Items 3, 5, 8, 9 and 10 require inverse scoring. A high total score indicates an elevated level of self-esteem.

Anxiety and depression symptoms: These were measured using the Hospital Anxiety and Depression Scale [18] under its French version [19]. This questionnaire contains 14 items, half of them dedicated to measuring depressive symptoms (e.g., "I feel as if I am slowed down"), and the other half to anxiety (e.g., "I feel tense or wound up"). Items are rated on a 4-point scale (e.g., not at all = 0, sometimes = 1, very often = 2, nearly all the time = 3). For each of these two subscales, high total scores suggest stronger symptoms.

Psychological flexibility: The Acceptance and Action Questionnaire-II (AAQ-II) is a seven-item measure of psychological flexibility defined as the ability to fully contact the present moment and the thoughts and feelings it contains without needless defense [20,21]. An item example is: "I worry about not being able to control my worries and feelings". Each item is followed by a seven-category response scale, ranging from 1 = never true to 7 = always true. Higher scores indicate higher psychological inflexibility.

Statistical analyses

The statistical analyses were performed using IBM SPSS Statistics version 24.

RESULTS

Sociodemographic characteristics and descriptive statistics

The sample was composed of 1107 women who completed the questionnaire. Sociodemographic characteristics are shown in table 1. The mean age of the sample was 34.94 years (SD = 11.5). About two thirds of the sample had a university degree, and a similar ratio had a job. Slightly more than two thirds of participants lived as a couple. About half of the sample had at least one child.

Descriptive statistics are shown in table 2 (left part). The mean self-reported BMI of the whole sample (26.6 ± 7.05) is located within the 25-30 range considered as overweight. The mean score for body image dissatisfaction was higher than 0, suggesting body image disturbance. The mean score of depressive symptoms (5.36 ± 3.69) is below the threshold score of 8, indicating the absence of depressive symptoms. In contrast, the mean score for anxiety (9.55 ± 3.89) is in the 8-10 range, which suggests possible anxiety issues. Regarding self-esteem, the mean score is within the 25-31 range, corresponding to a low level of self-esteem. All scales showed Cronbach's alpha values in the "very good-excellent" range (79-96).

Table 1: Sociodemographic Characteristics of the Sample.

Variable	n	%
Total	1107	100
Age (years) [range 18-65]	34.94 ± 11.50	100
BMI [range 15.82-55.57]	26.60 ± 7.06	100
Not overweight/obese (<25)	560	51
Overweight (≥25 - < 30)	255	23
Obese (≥30)	292	26
Marital status		
Single	337	30.42
As a couple	770	69.66
Educational level		
High school or less	341	30.87
Undergraduate degree	479	43.33
Graduate or higher degree	287	25.95
Professional status		
Having a job	749	67.71
Not having a job	358	32.32
Number of children		
None	550	49.75
1 or 2	397	35.87
3 or more	160	14.46

Table 2: Descriptive statistics (left part) and typology of individuals on three eating patterns (right part): Cluster comparison using ANOVA and Tukey post-hoc test.

	Sample	Range	alpha	Cluster M (SD)			F	Significant	Eta
	n = 1107			Low	High Restrained	High Emot. Ext.			
	M (SD)			*n* = 360 33%	*n* = 351 32%	*n* = 396 35%		comparisons	squared
DEBQ Restrained	2.86 (.82)	1 - 5	89	2.09 (0.53)	3.53 (.52)	2.97 (0.67)	544*	L < HEE < HR	49
DEBQ Emotional	2.98 (1.07)	1 - 5	96	2.16 (0.73)	2.69 (0.80)	4.00 (0.67)	638.04*	L < HR < HEE	53
DEBQ External	3.00 (0.68)	1 - 5	84	2.69 (0.52)	2.63 (0.46)	3.63 (0.50)	488.40*	L, HR < HEE	47
Age	34.94 (11.5)	18 - 65	*n.a.*	33.63 (10.89)	36.72 (12.34)	34.54 (11.08)	6.85*	L, HEE < HR	01
Education level	2.22 (1.26)	0 - 5	*n.a.*	3.58 (1.35)	3.26 (1.45)	3.16 (1.43)	8.95*	HR, HEE < L	02
Self-reported BMI	26.60 (7.05)	15.81 - 55.40	*n.a.*	24.31 (5.96)	26.60 (6.70)	28.69 (7.64)	38.76*	L < HR < HEE	07
Body image dissatisfact	1.67 (1.34)	-2 - 6	*n.a.*	1.07 (1.21)	1.73 (1.21)	2.17 (1.35)	72.27*	L < HR < HEE	12
Drive for thinness	7.87 (6.21)	0 - 21	86	3.73 (4.71)	9.07 (5.60)	10.56 (5.83)	158.93*	L < HR < HEE	22
Anxiety symptoms	9.55 (3.89)	0 - 19	79	8.34 (3.67)	9.43 (3.86)	10.75 (3.75)	38.85*	L < HR < HEE	07
Depressive symptoms	5.36 (3.69)	0 - 21	79	4.47 (3.38)	5.10 (3.41)	6.40 (3.95)	28.25*	L, HR < HEE	05
Self-esteem	29.30 (6.13)	10 - 40	88	30.92 (5.71)	29.73 (5.99)	27.44 (6.14)	33.55*	HEE < HR < L	06
Psychological flexibility	42.77 (10.78)	14 - 70	84	46.71 (9.76)	43.72 (9.94)	38.36 (10.81)	65.35*	HEE < HR < L	11

n.a.: not applicable;
* *p* < 05
L: Low Cluster; HR: High Restrained Cluster; HEE: High Emotional and External Cluster

Cluster analysis

Cluster analysis was conducted in two steps to generate profiles based on the individual scores for the three eating behaviors of DEBQ (restrained, emotional and external) converted to z-scores. Absence of multicollinearity was evaluated through the correlations between the variables selected for the cluster analysis (all variables had tolerance values > 65). In the first step, a hierarchical cluster analysis was conducted (Ward's method with squared Euclidean distance). Based on the dendrogram and the aggregation curve, a three-cluster solution was identified and plotted (Figure 1) by representing the mean z-scores of each cluster on the Y-axis and the DEBQ eating patterns on the X-axis. In the second step, K-means clustering was used to assign individuals to one of the identified clusters. A discriminant analysis showed clear differences between clusters (Wilks' λ = 188, *p* < 001) with 98.72% of cases correctly classified.

As shown in figure 1, a first cluster was composed of participants with scores of the restrained dimension higher than the sample mean by nearly one SD value, and scores below the mean for emotional and external patterns. This cluster was thus called "High Restrained" cluster (*n* = 351, 31.71%). A second cluster was constituted by individuals with scores of emotional and external behaviors higher than the sample mean by nearly one SD value, while their scores on the restrained pattern was close to the mean. This cluster was thus called "High Emotional and External" cluster (*n* = 396, 35.77%). The last cluster was composed of women with low scores (below the sample mean by at least half of one SD value) of the three eating patterns. It was thus named "Low" cluster (*n* = 360, 32.52%).

Using ANOVA and Tukey posthoc test, these clusters were compared to each other regarding sociodemographic data (age, educational level, self-reported BMI), eating behaviors, body image,
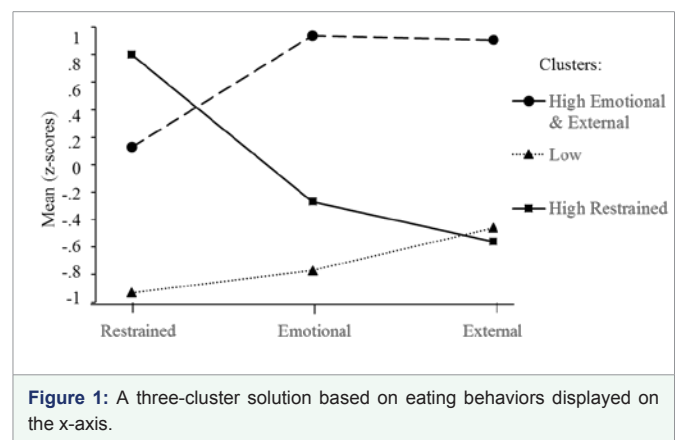

Figure 1: A three-cluster solution based on eating behaviors displayed on the x-axis.

depressive and anxiety symptoms, self-esteem and psychological flexibility. Firstly, this ANOVA revealed important differences between clusters regarding the Restrained, Emotional or External dimensions of DEBQ (Table 2), with large effect sizes (eta squared). This validated the cluster classification obtained above. Secondly, in comparison with "Low", the "High Restrained" and "High Emotional and External" clusters showed significantly lower signs of mental health, the latter cluster displaying the most worrying scores of the three clusters. Indeed, the "High Restrained" cluster, compared with "Low", showed an increased drive for thinness, a higher body image dissatisfaction, a higher anxiety score, and lower levels of self-esteem and psychological flexibility. The "High Emotional and External" cluster showed even greater signs of poor mental health than the "High Restrained" cluster, as its scores for all those variables and for depressive symptoms were significantly different and "unhealthier" than the "High Restrained" cluster.

DISCUSSION

This study identified three profiles of eating behavior in a sample of French women, namely a "High Restrained" pattern, a "Highly Emotional and External" profile and a pattern with low levels of these behaviors. These three clusters displayed significant differences between each other when considering a number of variables. As mainstream outcomes, the "High Restrained" cluster showed a less healthy profile compared with the Low cluster, considering that almost all scores were less "healthy" in "High Restrained" compared with "Low", including increased signs of disturbed eating behaviors (drive for thinness), higher body image dissatisfaction, increased anxiety, as well as lower self-esteem and psychological flexibility. Furthermore, the "High Emotional and External" cluster appeared to be even more altered than "High Restrained" in terms of mental health status. Indeed, the scores of the "High Emotional and External" cluster were significantly "unhealthier" than the "High Restrained" cluster, when considering all variables measured to characterize the different clusters (anxiety and depressive symptoms, drive for thinness, body image dissatisfaction, self-esteem, psychological flexibility, and self-reported BMI).

The three-cluster solution identified in this study is reminiscent of the results reported in Portuguese higher education students. Indeed, using cluster analysis of eating behaviours Poinhos, et al. [11] also revealed an identical number of eating styles, namely high emotional, external and binge eating (called "Overeating" cluster), high eating restraint cluster or high eating self-efficacy cluster appear to be very similar to those described in our study.

As an illustration of this correspondence, their "Overeating" cluster, in comparison with the two other clusters, showed the highest scores of emotional and external dimensions, which is also the case of our "High Emotional and External" cluster when compared with the "High Restrained" and "Low" clusters. The "Overeating" cluster also had an intermediate level of Rigid control (that can be taken as a dimension comparable with the restrained dimension of DEBQ), which is also a feature of our "High Emotional and External" cluster. On the same theme, both their "High self-efficacy" cluster and our "Low" cluster share the lowest scores of emotional, external and rigid control when compared with all other clusters. Moreover, in both studies, both the "High eating restrain/High restrained" clusters are characterized by the highest scores on the restrictive dimension, by emotional scores intermediate between the "Overeating/High emotional-external" and the "High self-efficacy/Low" clusters, and by external scores not significantly different from the "High self-efficacy/Low" clusters. Therefore the rate of similarity between our classification and that observed by Poinhos, et al. [11]. Appeared quite high, although both studies were performed on populations differing in age and educational level.

Regarding BMI, we observed that women from the "High restrained" group have a mean BMI higher than the "Low" group. One could have expected that the "High Restrained" group had a lower BMI, considering that restrained eating consists of intentionally limiting food intake to lose, or not gain weight. Nevertheless, restrained eating is determined by rigid rules and cognitions, as well as ignorance of internal regulatory signals such as hunger [6]. This pattern can thus be easily destabilized, leading to the abandonment of the cognitive resolve to diet, and ultimately resulting in excessive food intake [7], the risk of developing bulimic behaviors being higher when dieting was severe [22]. Therefore, the fact that the "High Restrained" group has a higher BMI than "Low" is consistent with the idea that restrained eating is involved in the etiology of overeating. Moreover, the fact that only the "Low" group is within the normal range for BMI, while the "High restrained" and "High Emotional and External" groups are in the overweight range supports the concept that these eating behaviors are involved in the etiology of overeating.

This study has limitations, including a cross-sectional design and self-reported measures. However, in the case of BMI, a study in a sample of women in France showed that the difference between self-reported and measured BMI was below 2% [23]. In addition, this study is based on a convenience sample, invited by social networks. Although internet data collection methods, using online completion of self-report questionnaires from self-selected samples, are consistent with findings from traditional methods [24], the possibility that participant self-selection may have biased the results cannot be excluded.

This study relies on a large number of participants, the psychometric qualities of the scales, and the overall replication of the subtyping proposed by Poinhos, et al. [11]'s in a student sample. Moreover, our study examined the psychological health status that was associated with each of the identified subtypes.

CONCLUSION

This study identified three distinct clusters based on eating styles in a sample of French women from the general population. Two of these clusters, representing altogether two thirds of the sample, are characterized, respectively, by "Highly Restrained" and "Highly Emotional and External" eating styles and are associated with significantly lower mental health status when compared to the third group defined with standard eating style. This further defines the psychopathological correlates of these eating patterns.

REFERENCES

1. Van ST, Herman CP, Verheijden MW. Eating style, overeating and overweight in a representative dutch sample. Does external eating play a role?. Appetite. 2009; 52: 380-387. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/19100301

2. Cebolla A, Barrada JR, van Strien T, Oliver E, Banos R. Validation of the Dutch Eating Behavior Questionnaire (DEBQ) in a sample of Spanish women. Appetite. 2014; 73: 58-64. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/24177441

3. Topham GL, Hubbs-Tait L, Rutledge JM, Page MC, Kennedy TS, Shriver LH, et al. Parenting styles, parental response to child emotion and family emotional responsiveness are related to child emotional eating. Appetite. 2011; 56: 261-264. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/21232566

4. Barrington WE, Beresford SAA, McGregor BA, White E. Perceived stress and eating behaviors by sex, obesity status and stress vulnerability: Findings from the vitamins and lifestyle (VITAL) study. J Acad Nutr Diet. 2014; 114: 1791-1799. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/24828150

5. Neel JV. Diabetes mellitus: A "thrifty" genotype rendered detrimental by "progress"?. Am J Hum Genet. 1962; 14: 353-362. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/13937884

6. Herman CP, Polivy J. The self-regulation of eating: Theoretical and practical problems. In: Vohs RFB& KD, editor. Handb. Self-Regul Res. Theory Appl. New York, NY, US: Guilford Press; 2004, p. 492-508.

7. Herman CP, van Strien T, Polivy J. Undereating or eliminating overeating?. Am Psychol. 2008; 63: 202-203. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/18377113

8. Bauer DJ, Shanahan MJ. Modeling complex interactions: Person-centered and variable-centered approaches. Model Context Eff Longitud Stud. 2007; 1: 255-283. http://bit.ly/2PvfKfe

9. Newby PK, Tucker KL. Empirically derived eating patterns using factor or cluster analysis: A review. Nutr Rev. 2004; 62: 177-203. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/15212319

10. Bouhlal S, McBride CM, Trivedi NS, Agurs-Collins T, Persky S. Identifying eating behavior phenotypes and their correlates: A novel direction toward improving weight management interventions. Appetite. 2017; 111: 142-150. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/28043857

11. Poinhos R, Oliveira BM, Correia F. Eating behaviour patterns and BMI in Portuguese higher education students. Appetite. 2013; 71: 314-320. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/24045208

12. Lluch A, Kahn JP, Stricker-Krongrad A, Ziegler O, Drouin P, Mejean L. Internal validation of a French version of the dutch eating behaviour questionnaire. Eur Psychiatry. 1996; 11: 198-203. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/19698450

13. Van Strien T, Frijters JER, Bergers GPA, Defares PB. The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional and external eating behavior. Int J Eat Disord. 1986; 5: 295-315. http://bit.ly/2syaC11

14. Stunkard AJ, Sorensen T, Schulsinger F. Use of the Danish adoption resister for the study of obesity and thinness. Res Publ Assoc Res Nerv Ment Dis. 1983; 60: 115-120. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/6823524

15. Garner DM. Eating disorder inventory-2: Professional manual. Psychological Assessment Resources, Odessa. 1991. http://bit.ly/36FR89u

16. Criquillion-Doublet S, Divac S, Dardennes R, Guelfi JD Le. Eating Disorder Inventory (EDI). In: JD Guelfi VG & RD, editor. Psychopathol. Quant, Paris: Masson; 1995; 249-260.

17. Vallieres EF, Vallerand RJ. Traduction et validation canadienne-française de l'échelle de l'estime de soi de Rosenberg. Int J Psychol. 1990; 25: 305-316. http://bit.ly/2r0RSqH

18. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983; 67: 361-370. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/6880820

19. Razavi D, Delvaux N, Farvacques C, Robaye E. Validation de la version française du HADS dans une population de patients cancereux hospitalises. Revue de Psychologie Appliquee. 1989; 9: 295-307. http://bit.ly/35uUdsW

20. Bond FW, Hayes SC, Baer RA, Carpenter KM, Guenole N, Orcutt HK, et al. Preliminary psychometric properties of the acceptance and action Questionnaire-II: A revised measure of psychological inflexibility and experiential avoidance. Behav Ther. 2011; 42: 676-688. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/22035996

21. Monestes JL, Villatte M, Mouras H, Loas G, Bond FW. French translation and validation of the Acceptance & Action Questionnaire (AAQ-II). Eur Rev Appl Psychol. 2009; 59: 301-308.

22. Stice E, Davis K, Miller NP, Marti CN. Fasting increases risk for onset of binge eating and bulimic pathology: A 5-year prospective study. J Abnorm Psychol. 2008; 117: 941-946. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/19025239

23. Niedhammer I, Bugel I, Bonenfant S, Goldberg M, Leclerc A. Validity of self-reported weight and height in the French GAZEL cohort. Int J Obes Relat Metab Disord. 2000; 24: 1111-1118. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/11033979

24. Gosling SD, Vazire S, Srivastava S, John OP. Should we trust web-based studies? A comparative analysis of six preconceptions about internet questionnaires. Am Psychol. 2004; 59: 93-104. **PubMed:** https://www.ncbi.nlm.nih.gov/pubmed/14992636