Different methods of assessment, food addiction, emotional eating, and binge eating behaviors: comparing the total model effects of sequential mediation analysis

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Abstract.

Food addiction (FA) is often associated with compulsive overeating and binge eating disorders (BED). However, few studies have investigated the process that could lead to binge eating behaviors starting from FA. Literature showed that FA may trigger emotional eating (EE) – an intensive need to eat to cope with negative emotive states. Moreover, EE often leads to experience negative feelings and cognitions (*i.e.*: guilt and lack of control) that in turn may lead to binge eating behaviors. However, although FA is widely studied, no studies tested the effect of different methods of assessment on the aforementioned psychological process. Thus, the present study aimed to fill this gap by comparing the effect of sequential mediation analysis of two samples. Participants (N = 215) were randomly divided into two groups who completed a battery of questionnaires with two different methods. The sequential mediation analysis provided satisfying results both in the overall sample as well as in each group. The effect of the method of assessment was assessed by overlapping the total mediation effects of the two groups. The overlapping index (η) suggests a great overlap between the effects of the two groups. These findings suggested that the method of assessment had a small effect on the process that starts from FA leading to binge eating behaviors – through EE and negative feelings/cognitions. These results suggest that the psychological process leading to binge eating behaviors would seem not to be particularly affected by the method of assessment.

Keywords: Food addiction, emotional eating, binge eating, mediation analysis, path analysis, overlapping index, assessment, online survey.

1   Introduction

Scientific literature has well established that certain kinds of foods (*i.e.*: sweetened foods, foods with high levels of refined carbohydrates, and food with added fat) have an addictive and rewarding effect similar to drugs [1, 2]. This evidence reinforces the hypothesis that some individuals could be addicted to food [3-7] – namely, individuals with food addiction (FA) [6, 8, 9]. The popularity of FA could be attributed to its dual nature [4, 10, 11]. On one hand, FA shares core symptoms that can be seen in substance addiction-related disorders [5] and – on the other hand – FA shares clinical characteristics of eating disorders (EDs) such as binge eating disorder (BED) [3, 12].

Individuals with overweight/obesity and/or with problematic EDs [13-15] often show a sort of addictive-like eating behavior [12, 14] – that lead to experience significant life impairment (both physical and social), negative emotive states, and/or depressive mood that in turn could provoke psychological distress [12].

Consequently, the urgency to cope with these negative affective states could lead individuals to feel an '(overwhelming) impulse to eat' [16, 17] – namely, emotional eating (EE). Indeed, individuals with FA seem to use EE as a coping strategy for psychological distress [13, 17] – suggesting that FA may lead to EE behaviors.

Furthermore, these impulses to eat in response to negative states could lead individuals to experience other kinds of negative feelings (and/or cognitions) [18] such as preoccupations, worries, feelings of guilt, and feelings of lack of control – that may trigger compulsive overeating and/or binge eating behaviors [19].

In parallel, in the last few years, several studies underlined the need for a technological evolution of psychology toward a computer-based approach. Indeed, an improvement of technology-based psychological interventions was registered as well as intensive use of computer-based assessment and online surveys [20-24].

However, to date, scientific research shows some lacks concerning the comparison between 'classical' methods of assessment and 'technology-based' ones.

The present study was thus aimed to fill this gap, by assessing – for the first time – a sequential mediation model in which FA predicts EE that in turn predicts negative feelings/cognitions that in turn lead to binge eating behaviors. Moreover, it was evaluated if the different kinds of assessment methods (classical 'paper and pencil' *vs*. 'online' survey) produced dissimilar total model effects.

2   Material and Methods

2.1   Sample size

Considering statistical analyses of this study (see designated section), the sample size was calculated *a priori* by modifying the formula provided by Tabachnick and Fidell [25] – allowing also considering the number of groups. The new formula was:

$$N > [(50+8m)*g]$$

Where *N* is the required sample size, *m* is the highest possible number of paths within the structural model equation (namely, the saturated model), and *g* is the number of groups. Consequently, the final sample should have guaranteed at least 196 subjects – 98 participants *per* each group.

2.2   Procedure and Participants

All of the participants were inpatients recruited at the San Giuseppe Hospital, IRCCS, Istituto Auxologico Italiano, Verbania (Italy) during the first week of a one-month residential program for weight reduction and rehabilitation. Inclusion criteria were: (A) having a BMI ≥ 35; (B) being a native Italian-speaker; and (C) being over 18 years old. Exclusion criteria were: (D) illiteracy and (E) inability to complete the assessment. All participants signed informed consent.

Inpatients were randomly assigned in one of two different groups. The first sample (A) filled out the battery of questionnaires with the *classical 'paper and pencil' assessment*. The second sample (B) compiled the same questionnaires with a *'technology-based' ('online' survey) assessment* – developed using the Qualtrics software.

The final sample comprised 215 participants: 95 males (44.2%) and 120 females (55.8%) aged from 18 to 75 years (*M* = 51.36, *SD* = 13.48), with BMI ranged from 35.32 to 83.21 (*M* = 43.79, *SD* = 6.75). The sample (A) *'paper and pencil' assessment* was composed of 110 inpatients: 48 males (43.6%) and 62 females (56.4%) aged from 18 to 75 years (*M* = 52.87, *SD* = 13.79) with BMI ranged from 35.32 to 83.21 (*M* = 44.26, *SD* = 7.31). The sample (B) *'technology-based' assessment* was composed of 105 inpatients: 47 males (44.8%) and 58 females (55.2%) aged from 20 to 71 years (*M* = 49.78, *SD* = 12.82) with BMI ranged from 35.43 to 65.58 (*M* = 43.29, *SD* = 6.09).

2.3   Measure

The Yale Food Addiction Scale 2.0 (YFAS2.0)

The Italian version of the YFAS 2.0 [6, 9, 26] is a 35-item self-report scale assessing FA symptoms in the past 12 months [14, 26] – according to the 11 DSM-5 diagnostic criteria for SRAD. The YFAS 2.0 is composed of 35 items that have to be dichotomized (0 = "*non*-endorsed" *vs*. 1 = "endorsed") to compute the *symptom count* score and the *diagnostic score*. The former is the sum of the number of FA criteria endorsed [9], whereas the 'diagnostic score' classifies FA in four categories: (A) '*no FA*', (B) '*mild FA*', (C) '*moderate FA*', and (D) '*severe FA*' [9]. In this study, the YFAS 2.0 provides good reliability: Kuder-Richardson20: 0.863.

The Emotional Eating Scale (EES)

The EES [16] is a 25-item self-report questionnaire assessing EE across different emotions. Participants have to evaluate the intensity of the relationship between their mood/emotive status and the desire/urgency to eat. Recent studies revealed that the EES is composed of four different scales: (1) depression, (2) anger, (3) anxiety, and (4) somatic arousal [16]. Furthermore, an overall dimension is assumed allowing to compute a general/total score [16]. In this study, the EES provides good reliability: Cronbach's Alpha: 0.968

The Binge Eating Scale (BES)

The BES [18] is a 16-item self-report measure of binge eating tendencies. It investigates the frequency of thoughts, feelings, and behaviors associated with BED. The BES assesses cognitive/emotional and behavioral manifestations of binge eating. In addition to a total score, the BES is constituted by two scales: Feelings/Cognitions (FC) and Behaviors (B) In this study, Cronbach's alphas were 0.880 (total score), 0.764 (FC scale), and 0.809 (B scale).

2.4　Statistical Analyses

Statistical analyses were performed with R software and the following packages: lavaan [27], overlapping [28], corrplot [29], graphViz via DiagrammeR [30].

Preliminary analyses were performed to exclude potential confounding effects of the BMI and the age on the aforementioned psychological variables. Moreover, the Pearson correlation coefficient (r) was computed to evaluate the relationships between variables [25].

A sequential mediation analysis with observed variables (path analysis) was performed [31] with a 10'000 bootstrap resampling procedure by using a 4-step approach [31, 32]. *STEP1: A* predictor-only model was specified: the 'FA symptom count' (X) predicts 'binge eating behaviors' (Y). *STEP2*: the full sequential mediation model was specified: 'FA symptom count' (X) predicts 'binge eating behaviors' (Y) through 'emotional eating' (M1) and '(binge eating) feelings' (M2) – Figure 1. *STEP3*. The model specified in 'Step 2' was assessed in each group separately – sample (A) *vs.* (B). *STEP4*. Finally, the effect of the assessment method ('paper and pencil' *vs.* 'online survey') was tested by overlapping the standard density bootstrap distributions of the (standardized) total model effect [28, 33] – *via* the overlapping index (η). The η-index quantifies the magnitude (effect size) of a phenomenon – like similarities and/or differences between groups [28, 34]. The η-index ranges from 0 (= perfect separation) to 1 (= perfect overlap) – thus, it should be interpreted as other normalized effect sizes (*i.e.*: correlation coefficient, R^2, and percentage) [28].
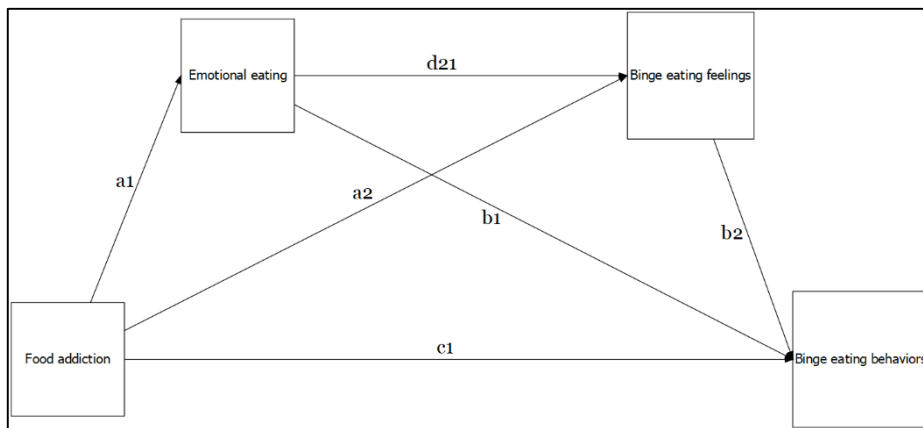

Figure 1. Conceptual model of the sequential mediation analysis (path analysis).

3   Results

3.1   Preliminary analysis

No statistically significant difference emerged between the two groups considering the BMI: $t = 1.059$, $p = 0.291$; $d = 0.144$. Moreover, no statistically significant difference emerged between the two groups considering age: $t = 1.701$, $p = 0.090$; $d = 0.232$.

Correlation coefficients between variables are reported in Figure 2. All correlations are statistically significant at $p < 0.001$.
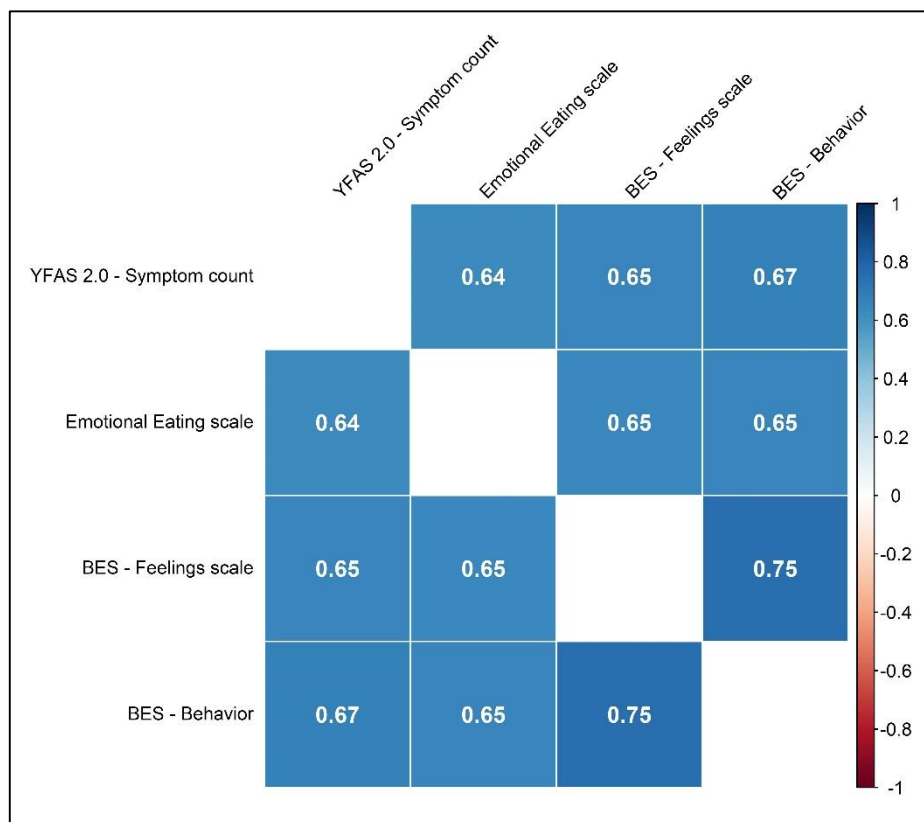

Figure 2: Correlation matrix between variables used in the path analysis.

3.2   Path analysis: a comparison between sequential mediation models

STEP1. The predictors-only model revealed a significant relationship between FA (X) and binge eating behaviors (Y): b* = 0.673, b = 1.202 (se = 0.102) [95%CI: from 0.994 to 1.394], $p < 0.001$. This model was also specified in each group – Sample (A): b* = 0.687, b = 1.286 (se = 0.143) [95%CI: from 0.980 to 1.545], $p < 0.001$; Sample (B): b* = 0.664, b = 1.135 (se = 0.146) [95%CI: from 0.844 to 1.420], $p < 0.001$.

STEP2 and STEP3. The full sequential mediation model (Figure 1) showed statically significant relationships between variables involved in the hypothesized process – both in the overall sample as well as in each group (Table 1). Moreover, the percentage of the total effect of FA (X) on binge eating behaviors (Y) mediated by EE (M1) and binge eating feelings (M2) was 63.6%, 49.6%, and 76.0% for the overall sample, the sample (A), and the sample (B), respectively.

	Path	b*	b (SE)	95%CI [L-U]
Overall sample (N = 215)				
X → M1	a1	0.638	5.252 (0.403)	4.451 - 6.039
M1 → M2	d21	0.390	0.073 (0.012)	0.049 - 0.097
M2 → Y	b2	0.466	0.543 (0.074)	0.398 - 0.687
X → Y	c1	0.245	0.437 (0.122)	0.202 - 0.686
X → M2	a2	0.405	0.620 (0.103)	0.420 - 0.824
M1 → Y	b1	0.194	0.042 (0.014)	0.015 - 0.068
Indirect effect	a1d21b2	0.116	0.207 (0.046)	0.124 - 0.303
Total Indirect effect		0.428	0.765 (0.092)	0.588 - 0.944
Total effect		0.673	1.202 (0.102)	0.995 - 1.395
Sample (A) – paper and pencil assessment (*n* = 110)				
X → M1	a1	0.624	5.211 (0.606)	3.947 - 6.348
M1 → M2	d21	0.281	0.053 (0.018)	0.020 - 0.089
M2 → Y	b2	0.397	0.474 (0.110)	0.262 - 0.697
X → M1	c1	0.346	0.648 (0.187)	0.285 - 1.017
X → M2	a2	0.470	0.736 (0.138)	0.464 - 1.006
M1 → Y	b1	0.136	0.030 (0.020)	-0.007 - 0.071
Indirect effect	a1d21b2	0.070	0.130 (0.052)	0.045 - 0.247
Total Indirect effect		0.341	0.638 (0.140)	0.367 - 0.918
Total effect		0.687	1.286 (0.119)	0.995 - 1.537
Sample (B) – online survey (*n* = 105)				
X → M1	a1	0.656	5.313 (0.546)	4.234 - 6.382
M1 → M2	d21	0.499	0.093 (0.018)	0.058 - 0.127
M2 → Y	b2	0.529	0.601 (0.098)	0.413 - 0.792
X → M1	c1	0.160	0.273 (0.168)	-0.047 - 0.614
X → M2	a2	0.333	0.501 (0.147)	0.226 - 0.803
M1 → Y	b1	0.236	0.050 (0.020)	0.011 - 0.090
Indirect effect	a1d21b2	0.173	0.296 (0.079)	0.157 - 0.471
Total Indirect effect		0.504	0.862 (0.129)	0.620 - 1.127
Total effect		0.664	1.135 (0.146)	0.854 - 1.418

Table 1. Path analysis coefficients.

Note: b* = standardized beta coefficient; b = unstandardized beta coefficient; X = FA symptom count; M1 = emotional eating; M2 = binge eating feelings; Y = binge eating behaviors.

STEP4. The η-index revealed considerable overlap between the estimated densities of the 'total model effect' of the two groups: $\eta = 0.729$ (72.9%) – with a consequential separation index ('1-η') of 0.271 (27.1%).
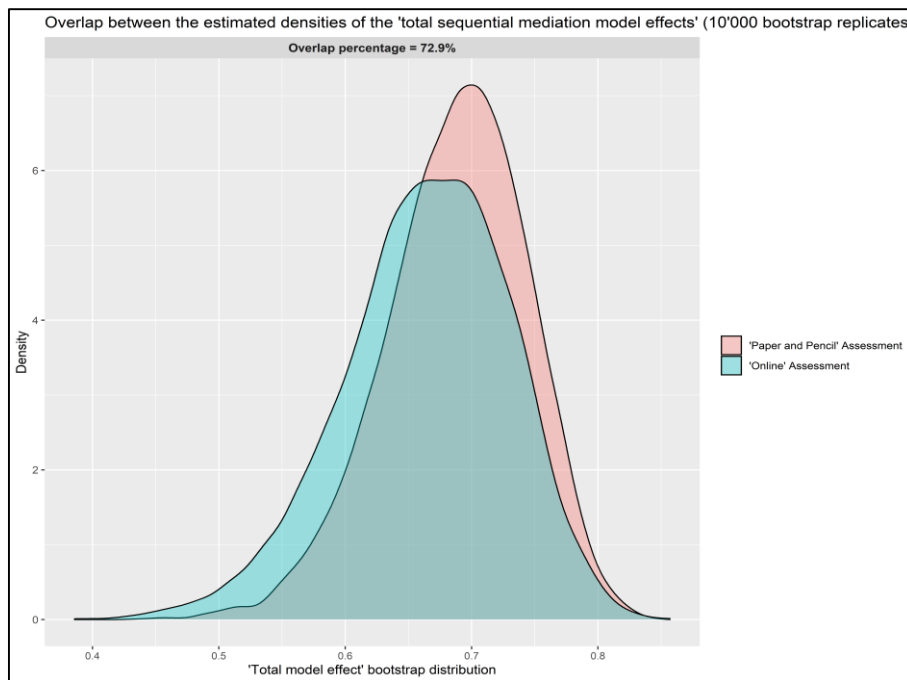

Figure 3. The overlap between the estimated densities of the 'total model effect' of the two groups.

4   Discussion

Several studies advocated the improvement of technology-based instruments for psychological interventions, assessment, and scientific research – underlying many advantages. Indeed, technology-based sampling methods (*i.e.*: snowball sampling) allow obtaining a huge amount of data – allowing to overcome several issues of psychological research. Also, online psychological interventions may facilitate attitudes toward seeking psychological help [35-39]. These interventions could be particularly advantageous for patients who have difficulties using clinical services in person – such as people with infective disease, progressively disabling disease, or severe obesity.

In particular, individuals with severe obesity may also show disordered eating behaviors as well as several psychological issues [40-42] such as FA and EDs. The presence of FA may be associated with an increase of binge eating episodes – thus, reinforcing the hypothesis that some EDs should be considered as addictions [7, 11].

However, the evaluation of potential differences related to the assessment method such as classical assessments (*i.e.*: 'paper and pencil') or technology-based assessment

(*i.e.*: 'online survey') – is a problem that often does not emerge in the field of scientific research. It is undeniable that if the method of assessment leads to non-overlapping results then scientific findings should be taken with caution.

To explore the magnitude of these differences, the present study compared (overlapped) the 'total effect' of the aforementioned mediation model – in two samples of inpatients who completed a battery of questionnaires with two different methods.

Results showed the observed psychological process that starts from FA and leads to binge eating behaviors [19] was mediated by other psychological variables. Indeed, FA was strongly associated with EE that in turn leads to experience negative feelings/cognitions that in turn could lead to binge eating behaviors [13] – suggesting a sequential process. Furthermore, this process was found both in the overall sample as well as in each group. Finally, the comparison between the total effect of each group showed a considerable overlap – suggesting that the process leading to binge eating behaviors would seem not to be particularly affected by the method of assessment.

Despite these findings, some limitations have to be highlighted. First, although the sample size was adequate to perform the path analysis, it could not be considered representative of inpatients with severe obesity. Also, this study is based on a specific sample of individuals and results could not generalizable to the general population.

Finally, despite future studies should deeply investigate differences related to a different method of assessment, these results showed that the process from FA to binge eating behaviors is sequentially mediated by EE and negative feelings/cognitions. Also, these findings suggest that the method of assessment did not produce considerable total model effect differences: thus, the two methods seem to show similar effects.

References

1. Avena, N.M., Rada, P., Hoebel, B.G.: Evidence for sugar addiction: Behavioral and neurochemical effects of intermittent, excessive sugar intake. Neuroscience and Biobehavioral Reviews 32, 20–39 (2008)
2. Volkow, N.D., Wise, R.A.: How can drug addiction help us understand obesity? Nature Neuroscience 8, 555-560 (2005)
3. Davis, C., Curtis, C., Levitan, R.D., Carter, J.C., Kaplan, A.S., Kennedy, J.L.: Evidence that 'food addiction' is a valid phenotype of obesity. Appetite 57, 711-717 (2011)
4. Gordon, E.L., Ariel-Donges, A.H., Bauman, V., Merlo, L.J.: What Is the Evidence for "Food Addiction?" A Systematic Review. Nutrients 10, 477 (2018)
5. Meule, A., Gearhardt, A.N.: Food addiction in the light of DSM-5. Nutrients 6, 3653-3671 (2014)
6. Meule, A., Gearhardt, A.N.: Ten Years of the Yale Food Addiction Scale: a Review of Version 2.0. Current Addiction Reports 1-11 (2019)
7. Rogers, P.J.: Food and drug addictions: Similarities and differences. Pharmacology Biochemistry and Behavior 153, 182-190 (2017)
8. Schulte, E.M., Wadden, T.A., Allison, K.C.: An evaluation of food addiction as a distinct psychiatric disorder. International Journal of Eating Disorders n/a, (2020)

9. Gearhardt, A.N., Corbin, W.R., Brownell, K.D.: Development of the Yale Food Addiction Scale Version 2.0. Psychology of addictive behaviors : journal of the Society of Psychologists in Addictive Behaviors 30, 113-121 (2016)

10. Albayrak, Ö., Wölfle, S.M., Hebebrand, J.: Does Food Addiction Exist? A Phenomenological Discussion Based on the Psychiatric Classification of Substance-Related Disorders and Addiction. Obesity facts 5, 165-179 (2012)

11. Gold, M.S., Frost-Pineda, K., Jacobs, W.S.: Overeating, binge eating, and eating disorders as addictions. Psychiatric Annals 33, 117–122 (2003)

12. Brewerton, T.D.: Food addiction as a proxy for eating disorder and obesity severity, trauma history, PTSD symptoms, and comorbidity. Eating and weight disorders : EWD 22, 241-247 (2017)

13. Gearhardt, A.N., White, M.A., Masheb, R.M., Morgan, P.T., Crosby, R.D., Grilo, C.M.: An examination of the food addiction construct in obese patients with binge eating disorder. International Journal of Eating Disorders 45, 657-663 (2012)

14. Manzoni, G.M., Rossi, A., Pietrabissa, G., Varallo, G., Molinari, E., Poggiogalle, E., Donini, L.M., Tarrini, G., Melchionda, N., Piccione, C., Gravina, G., Luxardi, G., Manzato, E., Schumann, R., Innamorati, M., Imperatori, C., Fabbricatore, M., Castelnuovo, G.: Validation of the Italian Yale Food Addiction Scale in postgraduate university students. Eating and weight disorders : EWD 23, 167-176 (2018)

15. Murphy, C.M., Stojek, M.K., MacKillop, J.: Interrelationships among impulsive personality traits, food addiction, and Body Mass Index. Appetite 73, 45-50 (2014)

16. Goldbacher, E.M., Grunwald, H.E., LaGrotte, C.A., Klotz, A.A., Oliver, T.L., Musliner, K.L., VanderVeur, S.S., Foster, G.D.: Factor structure of the Emotional Eating Scale in overweight and obese adults seeking treatment. Appetite 59, 610-615 (2012)

17. Whiteside, U., Chen, E., Neighbors, C., Hunter, D., Lo, T., Larimer, M.: Difficulties regulating emotions: Do binge eaters have fewer strategies to modulate and tolerate negative affect? Eating behaviors 8, 162-169 (2007)

18. Gormally, J., Black, S., Daston, S., Rardin, D.: The assessment of binge eating severity among obese persons. Addictive behaviors 7, 47-55 (1982)

19. Davis, C.: Compulsive Overeating as an Addictive Behavior: Overlap Between Food Addiction and Binge Eating Disorder. Current obesity reports 2, 171-178 (2013)

20. L'Hadi, B., Alain, J.: Can Online Peer Assessment be Trusted? Journal of Educational Technology & Society 12, 257-268 (2009)

21. Parola, A.: Novel Coronavirus Outbreak and Career Development: a narrative approach into the meaning of Italian university graduates. Frontiers in psychology (2020)

22. Parola, A., Rossi, A., Tessitore, F., Troisi, G., Mannarini, S.: Mental health through the COVID-19 quarantine: a growth curve analysis on Italian young adults. Frontiers in psychology (2020)

23. Rossi, A., Panzeri, A., Pietrabissa, G., Manzoni, G.M., Castelnuovo, G., Mannarini, S.: The Anxiety-Buffer Hypothesis in the Time of COVID-19: When Self-Esteem Protects From the Impact of Loneliness and Fear on Anxiety and Depression. Frontiers in psychology, Front. Psychol. 11, 2177. (2020)

24. Skinner, H.A., Pakula, A.: Challenge of computers in psychological assessment. Professional Psychology: Research and Practice 17, 44-50 (1986)

25. Tabachnick, B.G., Fidell, L.S.: Using Multivariate Statistics. Pearson, Harlow (2014)

26. Manzoni, G.M., Rossi, A., Pietrabissa, G., Mannarini, S., Fabbricatore, M., Imperatori, C., Innamorati, M., Gearhardt, A.N., Castelnuovo, G.: Structural validity, measurement invariance, reliability and diagnostic accuracy of the Italian version of the Yale Food Addiction Scale 2.0 in patients with severe obesity and the general population. Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity (2020)

27. Rosseel, Y.: lavaan: An R Package for Structural Equation Modeling. Journal of Statistical Software 48, 1-36 (2012)

28. Pastore, M., Calcagnì, A.: Measuring Distribution Similarities Between Samples: A Distribution-Free Overlapping Index. Frontiers in psychology 10, (2019)

29. Wei, T., Simko, V.: R package "corrplot": Visualization of a Correlation Matrix. (2017)

30. Iannone, R.: DiagrammeR: Graph/Network Visualization. (2018)

31. Hayes, A.F.: Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford publications, New York, NY (2017)

32. MacKinnon, D.P.: Introduction to statistical mediation analysis. Routledge, New York, NY (2012)

33. Wen, Z., Fan, X.: Monotonicity of effect sizes: Questioning kappa-squared as mediation effect size measure. Psychological Methods 20, 193-203 (2015)

34. Huberty, C.J., Lowman, L.L.: Group overlap as a basis for effect size. Educational and Psychological Measurement 60, 543-563 (2000)

35. Ratti, M.M., Rossi, A., Delli Zotti, G.B., Sarno, L., Spotti, D.: Social support, psychological distress and depression in hemodialysis patients. Psicologia della Salute 112-122 (2017)

36. Rossi, A., Mannarini, S.: The Italian version of the attitudes toward seeking professional psychological help scale – short form: The first contribution to measurement invariance. TPM - Testing, Psychometrics, Methodology in Applied Psychology 26, 93-100 (2019)

37. Mannarini, S., Boffo, M., Rossi, A., Balottin, L.: Etiological beliefs, treatments, stigmatizing attitudes toward schizophrenia. What do Italians and Israelis think? Frontiers in psychology 8, (2018)

38. Mannarini, S., Rossi, A.: Assessing mental illness stigma: A complex issue. Frontiers in psychology 9, (2019)

39. Mannarini, S., Rossi, A., Munari, C.: How do education and experience with mental illness interact with causal beliefs, eligible treatments and stigmatising attitudes towards schizophrenia? A comparison between mental health professionals, psychology students, relatives and patients. BMC Psychiatry 20, 167 (2020)

40. Pietrabissa, G., Rossi, A., Simpson, S., Tagliagambe, A., Bertuzzi, V., Volpi, C., Fava, G., Manzoni, G.M., Gravina, G., Castelnuovo, G.: Evaluation of the reliability and validity of the Italian version of the schema mode inventory for eating disorders: short form for adults with dysfunctional eating behaviors. Eating and Weight Disorders 25, 553-565 (2020)

41. Simpson, S., Pietrabissa, G., Rossi, A., Seychell, T., Manzoni, G.M., Munro, C., Nesci, J.B., Castelnuovo, G.: Factorial Structure and Preliminary Validation of the Schema Mode Inventory for Eating Disorders (SMI-ED). Frontiers in psychology 9, 600 (2018)

42. Manzoni, G.M., Rossi, A., Marazzi, N., Agosti, F., De Col, A., Pietrabissa, G., Castelnuovo, G., Molinari, E., Sartorio, A.: Feasibility, Validity, and Reliability of the Italian Pediatric Quality of Life Inventory Multidimensional Fatigue Scale for Adults in Inpatients with Severe Obesity. Obesity facts 11, 25-36 (2018)