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Original Article

Psychometric Properties of the Persian Version of the Weight Control Strategies Scale (WCSS)

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Abstract

Objective: The purpose of the present study was to examine the validity and reliability of the Persian version of the Weight Control Strategies Scale among individuals engaged in weight loss or weight maintenance.
Method: This descriptive study conducted from October 2019 to February 2020 on social media networks. A total of 420 men and women were selected using consecutive sampling. They completed the Persian version of the Weight Control Strategies Scale and the Self-Compassion Scale. Data were analyzed using descriptive statistics, Cronbach's α, confirmatory factor analysis, and Pearson product-moment correlations.
Results: Internal consistency for the total score of the Persian version of Weight Control Strategies Scale was excellent and acceptable to good for all 4 subscales (in all cases over α = 0.70). Confirmatory factor analysis supported the factor structure of the original model of the scale, but, it was different from the model at the item level. Moreover, the Persian version of Weight Control Strategies Scale had good convergent validity.
Conclusion: Psychometrically speaking, the Persian version of the Weight Control Strategies Scale is a valid and reliable tool to assess the psychological and behavioral profile of individuals engaging in losing or maintaining weight, both for clinical and research purposes.

Key words: *Body Weight Maintenance; Cognitive Behavioral Therapy; Factor Analysis; Psychometrics; Statistical; Self Report; Weight Loss*

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Obesity leads to broad impairments in physical and psychological dimensions (1). Some of the common physical and psychological problems include type 2 diabetes, cardiovascular disease, and several types of cancer (2), depression, and low self-esteem (3). Furthermore, those problems may directly and indirectly be associated with substantial medical costs (4). According to the World Health Organization (5), in 2016, 18% of people aged between 5 to 19 years and 39% of people aged 18 and over were obese (BMI ≥ 30). Regarding the worldwide increase in the prevalence of obesity (6), research on obesity became one of the worldwide health priorities.

The consumption of energy in persons suffering from obesity is imbalanced, which means the received energy is higher than the consumed energy (7). In this lack of balance, several factors are involved, such as genetic, hormonal, behavioral, and social factors (8). Regarding the behavioral factors, theories focused on eating behavior and physical activity; therefore, the standard behavioral treatment (SBT) was developed as a proxy of those theoretical focuses (9).

The need for a capable assessment was felt to evaluate the effectiveness of the behavioral treatment, along with its formation. The main focus of the early behavioral interventions was on eating behaviors, such as eating only in one place, which led to developing eating behavior inventory (EBI) (10). The EBI items were designed based on behavioral weight loss (BWL) interventions in the 70s (11). Research has shown EBI scores significantly increased in persons receiving BWL treatment (e.g., 12, 13) and posttreatment weight loss was positively associated with the EBI scores (e.g., 14, 15).

Over the past decades, considering the multifactorial nature of obesity, several studies on behavioral changes in obesity has shown that introducing psychological coping skills and physical activity as a part of the intervention lead to better short-term and long-term outcomes in BWL treatments (16, 17). Based on these results, the content of the current BWL treatments has changed (11).

The components of the recent BWL program are as follow: (a) goal setting (setting goals for eating, exercising, and measuring weight eating); (b) self-monitoring (recording calorie intake, physical activity, and weight); (c) stimulus control (changing environmental cues such as visibility and availability of snickers and sport equipment to improve or increase healthy behavior); and (d) cognitive interventions (identifying cognitive errors, challenging sabotaging thoughts, and modifying irregulated emotions) (18). To evaluate the impact of a BWL program, a measure that covers assessing all mentioned components is required (11).

To assess different aspects of BWL treatments, Pinto, Fava, Raynor, LaRose, and Wing (11) developed a 30-item scale called Weight Control Strategies Scale (WCSS) with 4 subscales: (a) dietary choices (DC); (b) self-monitoring (SM); (c) physical activity (PA); and (d) psychological coping (PC). These subscales correspond to the components of the recent BWL program. The study found that psychometric properties of the WCSS were promising, suggesting that it could be used to assess behavioral and psychological weight loss strategies in BWL treatments.

There are several studies which applied the WCSS to assess strategies and behaviors in individuals who are engaged in losing or maintaining weight (19-25). However, to our knowledge, no other study has been conducted on its psychometric properties. Given the need for cultural adaptation of the tool when used in another country and another language, and considering reliable results are achievable via standardized and validated tools (26), the chief aim of this study was to investigate the validity and reliability of the Persian version of the WCSS in Iranian people who were engaged in losing or maintaining weight.

Materials and Methods

Participants

This descriptive study conducted from October 2019 to February 2020 on social media networks such as Instagram and LinkedIn. A total of 420 persons who are engaged in losing or maintaining weight loss were approached. The procedure of the study and the secure data handling were explained to the participants. Then, once participants signed the electronic informed consent, they were able to answer the online questions. The inclusion criteria were as follow: (1) age between 18 and 65 years; (2) ability to read and write in Persian; (3) interest to follow the study procedure; (4) signed written informed consent; (5) planning to lose weight or maintain weight loss.

All eligible participants were consecutively enrolled in the study. Sample size for the confirmatory factor analysis (CFA) was determined based on Myers, Ahn, & Jin (N ≥ 200; 27).

Measures

Weight Control Strategies Scale (WCSS; 11). Weight Control Strategies Scale (WCSS) is a 30-item assessment tool for assessing the behavioral and psychological aspect of weight loss and weight maintenance. Pinto et al developed the self-report measure in 2013 for English-speaking populations. It consists of 4 subscales: dietary choices (10 items), self-monitoring (7 items), physical activity (6 items), and psychological coping (7 items). The items are rated on a five-point Likert-scale, ranging from 0 (never) through 4 (always). A total score is computed from the 30 items and divided by 30. The similar calculation is applied to calculate the score of each subscale: calculating the sum scores and dividing them by the number of the items of each subscale.

In the original study (11), the internal consistency was acceptable to good (Cronbach's α = 0.79-0.89). Furthermore, convergent validity with calorie expenditure through physical activity and discriminant validity with calorie and fat intake were adequate. Also, increase in WCSS total score and subscale scores were related to posttreatment weight loss (11).

Self-Compassion Scale (SCS; 28). For assessing self-compassion, participants accomplished the Self-Compassion Scale (SCS) questionnaire. The SCS is a 26 item scale with 6 separate subscales: self-kindness (5 items), self-judgment (5 items), common humanity (4 items), isolation (5 items), mindfulness (5 items), and over-identification (4 items). Answers are given on a 5-point rating scale ranging from 1 (almost never) to 5 (almost always), with higher scores reflecting higher levels of self-compassion.

In the original study (28), The SCS showed good internal consistency (Cronbach's α for SCS total: 0.92; Cronbach's α for SCS subscales: 0.75 to 0.81), good test–retest reliability (Correlation coefficient for SCS total: 0.93; Correlation coefficients for SCS subscales: 0.80 to 0.88) as well as adequate convergent and discriminant validity. Participants completed the Persian version of SCS validated by Hasani and Pasdar (29).

Procedure

Measure adaptation. to validate the Persian version of WCSS, and according to the International Test Commission (ITC) guidelines (30), the double-translation and reconciliation technique was used in this study. The translations were conducted by 2 bilinguals who were expert in the field of weight loss. Then, discrepancies between the forward translations were identified at an expert panel (n = 10) including 3 associate professors in psychology, 3 PhD students in health psychology with a strong background in research and practice of the field of weight loss, 1 specialist in the field of Persian literature and 1 specialist in the field of English literature, along 1 nutrition specialist and 1 fitness instructor. In the next step, to qualitatively evaluate content validity of the scale, a pretest on a group of 30 persons engaging in weight loss or maintaining weight was performed. In the field test, the meaning of the items and responses was explored. In the end, the finalized translated version of the Persian WCSS was prepared.

Measure administration. The authors entered the final translation of the Persian version of the WCSS and SCS in Google Docs and released the prepared link on social media. The online version was designed in a way that only people who engaged in weight loss or weight maintenance could respond to the items, and informed consent was signed by all participants. The ethical committee of the University of Kharazmi approved the study (Approval ID: IR.KHU.REC.1399.006).

Statistical Analysis

All statistical computations were performed with SPSS® 25.0 (IBM Corporation, Armonk, NY, USA) and LISREL version 8.54 (LISREL, Lincolnwood, IL, USA) for Apple® Mac®, and the nominal level of significance was set at alpha ≤ 0.05.

The adequacy of data was examined by calculating Skewness (cutoff ≤ |2|; (31) and Kurtosis (cutoff ≤ |7|; 31) for normality and Mahalanobis distance statistic for outlier analysis. Cronbach's α was used to calculate internal consistency. According to Hunsley & Mash (32), $0.70 < \alpha < 0.79$ = acceptable internal consistency, $0.80 < \alpha < 0.89$ = good internal consistency, and $0.9 \leq \alpha$ = excellent internal consistency. The difference between males and females in the Persian WCSS total and subscales were evaluated using independent sample t test.

To evaluate the adequacy of the data set for factor analyses, the Kaiser-Meyer-Olkin (KMO) test was performed (cut-off > 0.60; 33). The factor structure of the Persian WCSS was analyzed using CFA. To determine the adequacy of the model, several statistical analyses were performed, including chi-square (χ^2) test, the comparative fit index (CFI), non-normed fit index (NNFI), root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Given the sensitivity of the χ^2 to the sample-size and the violation of the multivariate normality assumption, chi-square ratios and degrees of freedom (χ^2/df), CFI, NNFI, RMSEA, and SRMR, were calculated (34). According to Schermelleh-Engel et al (34), $0 \leq \chi^2/df \leq 2$, $0.97 \leq CFI \leq 1$, $0.97 \leq NNFI \leq 1$, $0 \leq SRMR \leq 0.05$, and $0 \leq RMSEA \leq 0.05$ indicate a good fit and $2 < \chi^2/df \leq 3$, $0.95 \leq CFI < 0.97$, $0.95 \leq NNFI < 0.97$, $0.05 < SRMR \leq 0.10$, and $0.05 < RMSEA \leq 0.08$ indicate an acceptable fit.

A series of Pearson product-moment correlations was used for calculating the correlation between WCSS (overall score and all subscales) and SCS (overall score and all subscales). Correlation coefficients of ≥ 0.1, ≥ 0.3, and ≥ 0.5 indicate small, medium, and large effect sizes, respectively (35).

Results

Preliminary Data Analyses

The results of skewness and kurtosis values showed data were normally distributed (Table 1). The Mahalanobis distance statistic (D2) indicated that there were 8 multivariate outliers. Therefore, data from 412 participants (mean age: 32.48 years; SD = 9.05; 84.3% female) were analyzed.

Reliability

Cronbach's α for the subscales and the total score of the Persian WCSS were as follow: DC = 0.84, SM = 0.73, PA = 0.86, PC = 0.79, and WCSS total = 0.91 (Table 1).

Validity

Factor structure. The result of the KMO test (0.91) indicated that the Persian WCSS data were adequate for factor analysis. Factor loadings and T-values of the 4-factor model of the Persian WCSS are presented in

Table 2. All T-values were > 2 (33), but factor loading of the item 23 was < 0.32 (33) (Table 2). Therefore, the item was deleted and the original 30-item model was compared with the 29-item model (Table 3). The results of χ^2/df, CFI, NNFI, RMSEA, and SRMR indicated that both models had acceptable fit indices, but the 29-item model was the best model because relative fit indices (ECVI and AIC) values in this model were smaller than ECVI and AIC values in the 30-item model (33). Factor structure of the 29-item model is shown in Figure 1.

Convergent Validity

As reported in Table 4, the overall score and all subscales were significantly correlated with medium to large effect sizes, in the expected fashion with the self-compassion scores (measured with the SCS), providing evidence for convergent validity.

Table 1. Mean, Standard Deviation, Skewness, Kurtosis, and Cronbach's α for the Total Score and the Subscales of Persian WCSS

scale	M (SD)	Skewness	Kurtosis	α
WCSS-DC	2.30 (0.75)	-0.23	-0.33	0.84
WCSS-SM	1.06 (0.75)	0.22	0.31	0.73
WCSS-PA	1.70 (0.97)	0.18	-0.86	0.86
WCSS-PC	2.07 (0.81)	-0.13	-0.50	0.79
WCSS Total	1.84 (0.64)	0.11	-0.24	0.91

Note. WCSS-DC = Weight Control Strategies Scale Dietary Choices; WCSS-SM = Weight Control Strategies Scale Self-Monitoring; WCSS-PA = Weight Control Strategies Scale Physical Activity; WCSS-PC = Weight Control Strategies Scale Psychological Coping; WCSS Total = Weight Control Strategies Scale Total.

Table 2. Factor Loadings and T-Values of the 30-Item Model of the Persian WCSS

item	Standardized coefficients	T-values	Item	Standardized coefficients	T-values
1	0.64	13.31	16	0.54	11.01
2	0.48	9.77	17	0.60	12.83
3	0.76	16.95	18	0.78	17.48
4	0.84	20.51	19	0.57	11.96
5	0.53	10.69	20	0.47	9.41
6	0.40	8.02	21	0.69	15.16
7	0.70	15.64	22	0.66	14.60
8	0.66	14.52	23	0.11	2.05
9	0.54	10.90	24	0.88	21.84
10	0.61	13.08	25	0.57	11.62
11	0.82	19.65	26	0.47	9.70
12	0.68	14.39	27	0.76	17.33
13	0.52	10.80	28	0.35	6.79
14	0.58	12.02	29	0.68	14.58
15	0.78	17.34	30	0.70	15.52

Note. WCSS = Weight Control Strategies Scale

Table 3. Model Fit Indices for the 4-Factor Model of the Persian WCSS

model	χ^2	df	χ^2/df	CFI	NNFI	SRMR	REMSEA	AIC	ECVI
30-item	1163.56	399	2.91	0.95	0.95	0.071	0.068	1295.56	3.15
29-item	1104.41	371	2.97	0.95	0.95	0.072	0.069	1232.41	3.00

Note. χ^2 = likelihood ratio chi-square statistic; df = degree of freedom for the likelihood ratio test of the model versus saturated; χ^2/df = the ratios of the chi-square to its degrees of freedom; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; SRMR = Standardized Root Mean Squared Residual; RMSEA = Root Mean Square Error of Approximation; AIC = Akaike Information Criterion; ECVI = Expected Cross-Validation Index.

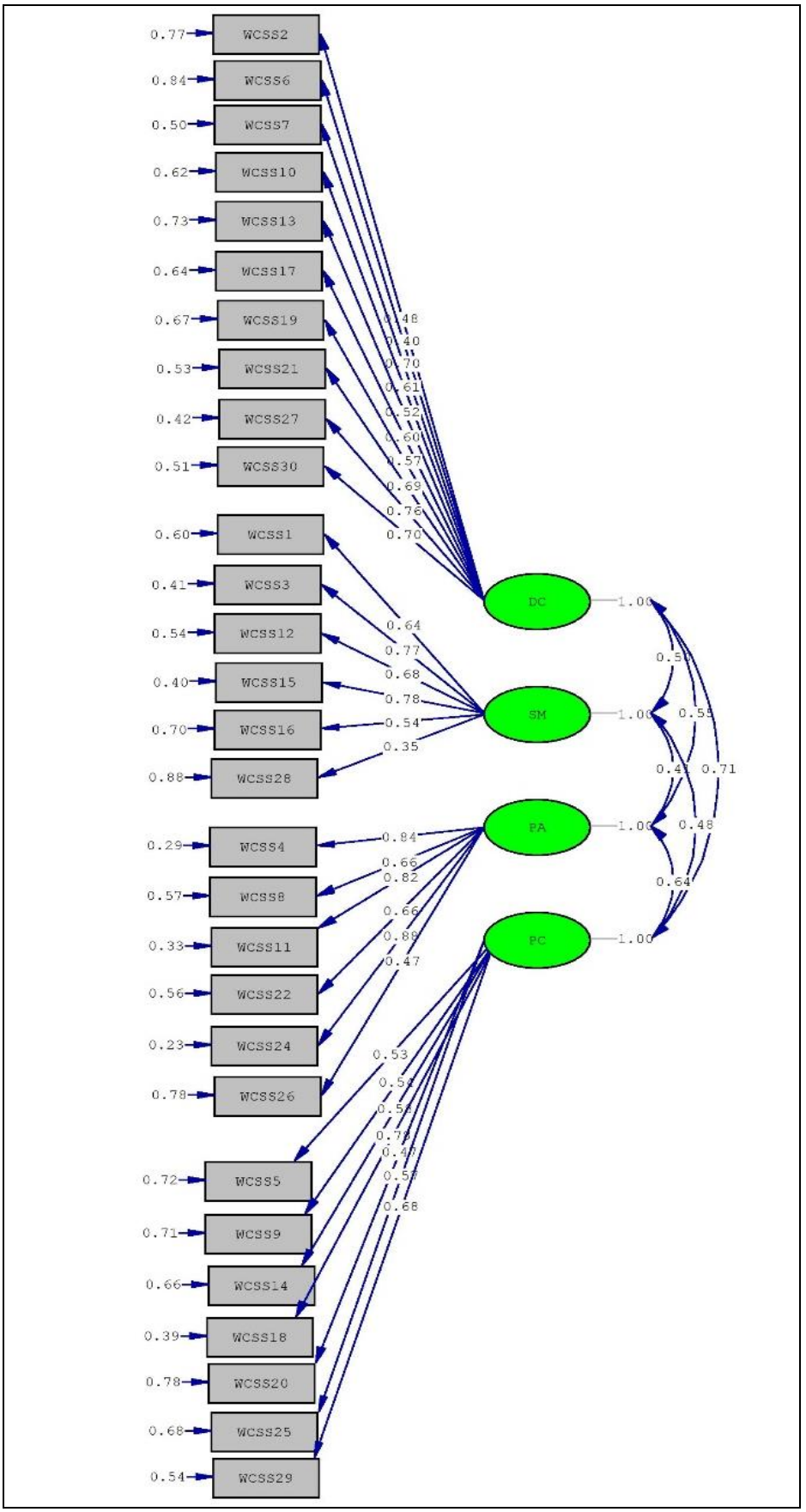

Figure 1. Factor Structure of the Persian Version of the Weight Control Strategies Scale

Table 4. Correlation Coefficients between the Overall Score of the WSCC, the Subscale Scores of the WSCC, the Overall Score of the SCS, and the Subscale scores of the SCS

	1	2	3	4	5	6	7	8	9	10	11	12
WCSS-DC (1)	-											
WCSS-SM (2)	0.44**	-										
WCSS-PA (3)	0.49**	0.39**	-									
WCSS-PC (4)	0.58**	0.42**	0.53**	-								
WCSS Total (5)	0.84**	0.70**	0.76**	0.80**	-							
Self-Kindness (6)	0.22**	0.16**	0.33**	0.33**	0.33**	-						
Self-Judgment (7)	0.06	0.02	0.09*	0.11*	0.09*	0.62**	-					
Common Humanity (8)	0.14**	0.12**	0.26**	0.25**	0.24**	0.54**	0.28**	-				
Isolation (9)	0.07	0.02	0.14**	0.16**	0.12**	0.57**	0.79**	0.29**	-			
Mindfulness (10)	0.21**	0.08*	0.27**	0.33**	0.29**	0.73**	0.46**	0.62**	0.45**	-		
Over-Identification (11)	0.08**	-0.00	0.11**	0.13**	0.11*	0.65**	0.82**	0.24**	0.79**	0.50**	-	
SCS Total (12)	0.16**	0.08	0.24**	0.26**	0.24**	0.85**	0.85**	0.59**	0.83**	0.77**	0.85**	-

Note. WCSS-DC = Weight Control Strategies Scale Dietary Choices; WCSS-SM = Weight Control Strategies Scale Self-Monitoring; WCSS-PA = Weight Control Strategies Scale Physical Activity; WCSS-PC = Weight Control Strategies Scale Psychological Coping; WCSS Total = Weight Control Strategies Scale Total; SCS Total = Self-Compassion Scale Total.
**P < 0.01 *P < 0.05

Discussion

The present study aimed to examine the validity and reliability of the Persian version of the WSCC among those who decided to lose weight or maintain weight loss. The key finding of this study shows that the Persian version of WCSS has acceptable psychometric properties. The pattern of the results confirms that the Persian WCSS is a reliable and valid self-report tool to evaluate different aspects of the current BWL treatments.

The analyses of the internal consistency showed acceptable to good estimates for all subscales as well as excellent internal consistency for the total score, which is well-matched with the findings of the original study (11).

Results from confirmatory factor analysis showed the four-factor structure found in the original study (11), but factor loading of item 23 (i.e., "I weighed myself daily.") was smaller than the cutoff point (0.32). One possible reason is in many weight loss programs, especially in Iran, it is not recommended to weigh daily (7). The results of relative fit indices of the model, with item 23 and without it, indicated that the later model was the best fitting model.

Collectively, the analyses of the convergent validity showed significant positive correlations between the Persian version of the WCSS and the SCS. The results are consistent with other studies focusing on the association between health-promoting behaviors and self-compassion (e.g., 36, 37). The results of the present study and other studies (38) suggest that self-compassion could be considered as a reliable coping strategy for reinforcing and prolonging the long-term outcomes of the SBT.

Limitation

There are several limitations in the study that should be noted. First, the self-report nature of the WSCC leads to biased results. Therefore, for future studies, objective assessments are suggested. Second, participants were those who were engaged to participate, which means they are already a specific group of the society with higher engagement, which may impact the result. Third, test-retest reliability of the Persian version of the WCSS was not evaluated. Finally, there were no instruments in this study that could be used as a theoretically distinct tool from WCSS, so no evidence could be provided for divergent validity.

Conclusion

This study could provide evidence that the Persian version of the WCSS has adequate psychometric properties. We suggest using the Persian WCSS to both researchers and clinicians to assess persons engaging in weight loss and weight control.

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Conflict of Interest

None.

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