

Stages of change in obesity and weight management: factorial structure of the Italian version of the University of Rhode Island Change Assessment Scale

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Abstract

Purpose To examine the factorial structure of the University of Rhode Island Change Assessment Scale (IT-URICA) for weight management in a sample of Italian overweight and obese patients enrolled in a nutritional rehabilitation program.

Methods 334 inpatients completed the translated and adjusted version of the IT-URICA at admission to the hospital. Psychometric testing included confirmatory factor analysis and internal consistency (Cronbach's α).

Results The IT-URICA for weight management was successfully translated into Italian, and the factorial analysis confirmed the four-factor solution of the commonly accepted version of the measure.

Conclusion High levels of RTC are considered critical to the long-term success of weight management, and the IT-URICA may be an appropriate measure of motivational

readiness for use among Italian overweight and obese patients. Its use is, therefore, recommended for clinical and research purposes.

Keywords Obesity · Overweight · Readiness to change · Stages of change · Validation · University of Rhode Island Change Assessment Scale

Introduction

Overweight and obesity are rapidly becoming global public health problems, to the point that the term “Globesity” has been recently coined to describe this ever-growing epidemic on an international scale [1]. The severity and duration of obesity highly contribute to the risk of developing co-morbidities, such as type 2 diabetes, cardiovascular disease, hypertension, kidney failure, and osteoarthritis, which further affect the clinical and emotional status of the sufferers [2, 3].

The individuals' ability to deal with symptoms, treatment, and social consequences of their illness are, therefore, necessary to improve their overall health status and quality of life [4]. Studies showed that self-management in patients with multiple chronic conditions is hardly applied, but also that high level of self-reported readiness to change (RTC) predicts engagement in health promotion activities [5, 6]. RTC refers to the degree in which an individual is motivated to engage with the change process and [7] it is, therefore, considered a prerequisite for responding to treatment. With the aim of combining key concepts that can be utilized in the application of conduct behavior modification in a variety of instances, Prochaska and Di Clemente proposed the transtheoretical model (TTM). It operates on the assumption that change in behavior occurs

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gradually and recursively along a series of stages [8]: precontemplation (PC), in which persons have not yet acknowledged that there is a problem behavior that needs to be changed; contemplation (C), comprising those individuals recognizing that they have a problem, but still feeling ambivalent toward change; action (A), including individuals who are implementing change plans and executing new behaviors; and maintenance (M), embracing those constantly acquiring new skills to deal with life and avoid relapses. Recent studies have reported the importance of matching treatment approaches with the individuals' needs, attitudes and resources toward change [9], and McConaughy, Prochaska and Velicer specifically developed the University of Rhode Island Change Assessment (URICA) to assess the individuals' levels of RTC [10]. Based on the TTM, this self-assessment tool can be applied on a range of different problems, including obesity, diet and weight management [9, 11].

Despite that empirical support for the use of the URICA for clinical and research purposes exists, research findings showed inconsistencies in the factor structure, scoring method and predictive validity of the measure across studies [12]. It is plausible that various mechanisms may operate for different health-related behaviors and that transitions between adjacent stages may vary depending on the problems. Thus, stages of change measures specifically focused on defined problems or targeted behavior are considered particularly reliable and useful [13].

Since the URICA has not yet been translated into Italian, the purpose of this study was to establish the factorial validity of the questionnaire in a sample of overweight and obese patients attending a nutritional rehabilitation program.

Method

Participants

Participants who voluntarily joined a 4-week hospital-based and medically managed program for weight reduction and rehabilitation were recruited from a single clinical center, Ospedale San Giuseppe, IRCCS, Istituto Auxologico Italiano, Verbania, Italy. Inclusion criteria were: (1) being over 18 years old; (2) being overweight or obese ($BMI \geq 25$) according to the WHO criteria [14]; (3) being Italian speaking; (4) signing written and informed consent to participate in the study. Exclusion criteria included illiteracy and the inability to complete the assessment due to vision impairments.

Patients were enrolled into the study at arrival to the clinic. The overall sample was composed of 334 inpatients, 201 female (60.2 %) and 131 male (39.2 %). Two individuals did not indicate their own gender (0.6 %). The

median age was 52.96 years for women and 55.34 years for men. The participants' mean weight was 115.98 kg ($SD = 21.95$), ranging from 68 to 217 kg. The descriptive statistics are reported below (Table 1).

Sample size calculation

Sample size was based on the rule of ten patients per item [15].

Translation and cross-cultural adaptation

The contents of the original URICA [10] were initially translated from English into Italian with the aim of retaining their meaning. The measure was originally developed for its general use with clinical populations, and patients are asked how they feel in the present referring to their "problem". However, overweight/obese persons with co-morbidities may experience particular worries with respect to illness concerns other than weight. Thus, the overall term "problem" included in the original version of the instrument has been here changed to make exclusive reference to weight problems (Table 2). Translations were made independently by two experts in the field, one of whom was unfamiliar with the measure. The questionnaire was adjusted using culturally and clinically fitting expressions until common adaptation was agreed. To ensure conceptual equivalency between translations, the Italian version of the URICA (IT-URICA) for weight management was also translated back into English by an independent translator not having expertise in this area of investigation. The scale was then administered to 28 inpatients, who did not enter the study to assess whether the items were understandable by the target population. No further adjustment was required.

Measures

Participants completed the Italian version of the University of Rhode Island Change Assessment Scale (IT-URICA) for weight management. It consists of 32 items on a five-point Likert scale (from 1 = strongly disagree to 5 = strongly agree) representing the four primary stages of change in the TTM, with eight items for each of the Precontemplation, Contemplation, Action and Maintenance subscales. The internal consistency of the original URICA is good with coefficient alphas from 0.79 to 0.89 for the four subscales [10].

Procedures

Overweight and obese inpatients were invited to participate in the study on admission to the clinic. The purpose of the

Table 1 Demographic characteristics of the study population

	Overall sample (<i>N</i> = 334)		Male (<i>N</i> = 131)		Female (<i>N</i> = 201)			
Age (median)	53.53		55.34		52.96		$\chi^2 = 3.79$	$p = 0.705$
18–24 (<i>N</i> ; %)	16	(4.8 %)	5	(3.8 %)	11	(5.5 %)		
25–34	27	(8.2 %)	10	(7.7 %)	17	(8.5 %)		
35–44	40	(12.1 %)	14	(10.8 %)	26	(13.1 %)		
45–54	87	(26.4 %)	35	(26.9 %)	52	(26.1 %)		
55–64	87	(26.7 %)	40	(30.8 %)	47	(23.6 %)		
65–74	66	(20.0 %)	25	(19.2 %)	41	(20.6 %)		
>74	6	(1.8 %)	1	(0.8 %)	5	(2.5 %)		
Marital status (<i>N</i> ; %)							$\chi^2 = 7.66$	$p = 0.022$
Single	76	(23.1 %)	38	(29.2 %)	38	(19.1 %)		
Married	178	(53.3 %)	71	(54.6 %)	107	(53.8 %)		
Divorced/widower	75	(22.5 %)	21	(16.2 %)	54	(27.1 %)		
Education (<i>N</i> ; %)							$\chi^2 = 0.287$	$p = 0.962$
Primary school	34	(10.5 %)	12	(9.4 %)	22	(11.1 %)		
Middle school	140	(41.9 %)	56	(43.8 %)	84	(42.2 %)		
High school	126	(37.7 %)	49	(38.3 %)	77	(38.7 %)		
University	27	(8.1 %)	11	(8.6 %)	16	(8.0 %)		
Occupational status (<i>N</i> ; %)							$\chi^2 = 0.002$	$p = 0.966$
Worker	156	(46.7 %)	62	(47.3 %)	93	(46.3 %)		
Non-worker	171	(51.2 %)	68	(51.9 %)	103	(51.2 %)		
Weight (mean; SD)	115.96	21.92	125.35	21.04	109.69	20.22	$t = 6.76$	$p < 0.001$
Height (mean; SD)	165.30	10.22	173.55	7.49	159.79	7.67	$t = 15.79$	$p < 0.001$
BMI (mean; SD)	42.44	7.29	41.55	6.02	42.99	8.01	$t = -1.75$	$p = 0.080$

Table 2 Examples of items from the original University of Rhode Island Change Assessment (URICA), its Italian translation and adaptation for weight management

Item	Original URICA (English version)	Original URICA (Italian version)	IT-URICA for weight management	Subscale
1	As far as I'm concerned, I don't have any problems that need changing	Per quanto mi riguarda, non ho nessun problema che debba essere risolto	Per quanto mi riguarda, non ho nessun problema di peso (=weight) che debba essere risolto	PC
15	I have a problem and I really think I should work on it	Ho un problema e penso realmente che dovrei lavorarci sopra	Ho un problema di peso e penso davvero che dovrei occuparmene	C
7	I am finally doing some work on my problem	Sto finalmente lavorando ai miei problemi	Sto finalmente lavorando al mio problema di peso	A
6	It worries me that I might slip back on a problem I have already changed, so I am here to seek help	Mi preoccupa l'eventualità di ricadere nel problema che avevo già affrontato; per questo ho deciso di cercare aiuto	Mi preoccupa l'eventualità di ricadere nel problema di peso che avevo già affrontato, e sono qui per cercare aiuto	M

PC Precontemplation, C Contemplation, A Action, M Maintenance

investigation was explained, and each participant was asked to give his or her consent to participate. Demographic information (age, gender, marital status, employment status and education) were also collected at inclusion. The IT-URICA for weight management was administered in group settings for convenience.

Statistical analysis

With the exception of the confirmatory factor analysis (CFA), which was performed to test the theoretically derived four-factor model of the IT-URICA for weight management [10] using the Mplus Software (version 7.,

Muthén, L. K. and Muthén, B. O., 1998–2013), all the other analyses were run by means of the Italian version of the SPSS software (version 20.0, SPSS Inc., Bologna, Italy).

As reported in Table 3, the descriptive statistics for items distribution analysis revealed that none of the indicators was normally distributed. Furthermore, they showed severe floor and ceiling effect for Contemplation, Action and Maintenance. Consequently, the robust weighted least squares (WLSMV) method was used to estimate the model via CFA [16, 17].

Factor loadings were tested for statistical significance and the model fit was assessed with the ratio of χ^2 to the degrees of freedom (*df*), the comparative fit index (CFI), the root mean-square error of approximation (RMSEA) and the weight root-mean-square residual (WRMR) [18]. A non-significant χ^2 is desirable [19] and smaller χ^2 values

indicate a better model fit. The χ^2/df ratio is considered as an easily, but never formally announced, computed measure of fit [20]. A χ^2/df ratio value of 5 or less indicates good fit [21]. CFI designates the amount of variance and covariance accounted by the model compared with a baseline model, and values higher than 0.90 are good [22]. The RMSEA expresses fit per degrees of freedom of the model, with values less than 0.08 implying an acceptable model fit [22] and values less than 0.05 indicating a good fit [23]. The WRMR measures the (weighted) average differences between the sample and estimated population variances and covariances and a cutoff value close to 0.95 or 1.0. is deemed good [17]. However, this fit index was only recently proposed by Muthén and Muthén [17] and Yu [24] and it should, therefore, be considered with caution in the statistical design of experiments [24]. Cronbach's alpha

Table 3 Descriptive statistics of the IT-URICA items (*N* = 334)

Factor	Item	Mean	Median	SD	Skewness (std. err.)	Kurtosis (std. err.)
PC (<i>M</i> = 15.97; <i>SD</i> = 6.11)	1	2.26	2	1.52	0.81 (.134)	−0.96 (.266)
	5	1.79	1	1.29	1.54 (.134)	0.99 (.267)
	11	1.48	1	1.01	2.42 (.134)	5.19 (.266)
	13	1.64	1	1.08	1.94 (.133)	3.11 (.266)
	23	2.84	3	1.32	0.08 (.135)	−1.12 (.269)
	26	2.10	2	1.31	0.99 (.133)	−0.25 (.266)
	29	2.42	2	1.47	0.62 (.134)	−1.08 (.267)
	31	1.53	1	0.93	2.19 (.133)	4.69 (.266)
C (<i>M</i> = 36.72; <i>SD</i> = 3.41)	2	4.61	5	0.78	−2.83 (.133)	9.38 (.266)
	4	4.68	5	0.66	−2.92 (.133)	10.85 (.266)
	8	4.71	5	0.63	−3.08 (.133)	12.48 (.266)
	12	4.55	5	0.79	−2.25 (.133)	5.78 (.266)
	15	4.68	5	0.63	−3.01 (.134)	12.88 (.266)
	19	4.31	5	0.91	−1.39 (.133)	1.59 (.266)
	21	4.54	5	0.73	−1.80 (.134)	3.77 (.266)
	24	4.67	5	0.58	−2.25 (.133)	7.56 (.266)
A (<i>M</i> = 35.14; <i>SD</i> = 4.33)	3	4.29	5	1.09	−1.69 (.134)	2.12 (.266)
	7	4.67	5	0.64	−2.31 (.134)	6.15 (.266)
	10	4.37	5	0.86	−1.83 (.134)	3.98 (.266)
	14	4.30	4	0.84	−1.48 (.134)	2.83 (.267)
	17	4.22	4	1.01	−1.56 (.134)	2.23 (.266)
	20	4.51	5	0.85	−2.35 (.133)	6.21 (.266)
	25	4.33	4	0.84	−1.67 (.134)	3.61 (.266)
	30	4.58	5	0.72	−2.51 (.134)	8.59 (.267)
M (<i>M</i> = 31.55; <i>SD</i> = 5.19)	6	4.44	5	0.96	−1.99 (.134)	3.59 (.266)
	9	3.56	4	1.29	−0.61 (.134)	−0.74 (.268)
	16	3.60	4	1.42	−0.72 (.134)	−0.82 (.267)
	18	3.81	4	1.19	−0.85 (.133)	−0.04 (.266)
	22	4.39	5	0.81	−1.51 (.133)	2.59 (.266)
	27	4.49	5	0.81	−2.25 (.134)	6.19 (.266)
	28	3.72	4	1.21	−0.71 (.134)	−0.49 (.267)
	32	3.68	4	1.21	−0.71 (.134)	−0.37 (.266)

was adopted as a measure of internal consistency, that is, how closely related a set of items are as a group, with values at least of 0.7 deemed acceptable measures of scale reliability [25].

Results

Model's fit and psychometric properties

The results from the CFA seemed to confirm the four-factor solution of the original URICA [10]. Indeed, despite that the Chi square for model fit was statistically significant [$\chi^2(459) = 1168.48, p < 0.001$], the root mean-square error of approximation and the comparative fit index showed adequate fit indices: RMSEA = 0.068 (90 % CI: from 0.063 to 0.073), p (RMSEA < 0.05) < 0.001; and CFI = 0.901. The WRMR appeared higher than the suggested cutoff of good fit (WRMR = 1.493). However, by dividing the χ^2 for the degrees of freedom (df) of the model [22], the tested model was potentially acceptable ($\chi^2/df = 2.54; < 3$). Moreover, as depicted in Table 4, all items loaded significantly on each factor ($p < 0.001$), $\text{mean}_{\text{loadings}} = 0.648$; $\text{SD}_{\text{loadings}} = 0.149$, ranging from 0.275 (item #23) to 0.882 (item #7), and R^2 varied from 0.076 (item #23) to 0.778 (item #7); $\text{mean}_{R-\text{sqr}} = 0.442$; $\text{SD}_{R-\text{sqr}} = 0.179$. In addition, correlations between factors ranged from 0.452 to 0.772. In line with other studies [26, 27], Precontemplation showed no significant associations with the other factors (PC and C: $r = -0.1; p = 0.068$. PC and A: $r = -0.107; p = 0.051$. PC and M: $r = 0.091; p = 0.097$). Contemplation, instead, was positively related to Action ($r = 0.772; p < 0.001$) and Maintenance ($r = 0.452; p < 0.001$) stages, and Action appeared positively associated with Maintenance ($r = 0.462; p < 0.001$). The test reliability revealed acceptable internal consistency, with Cronbach's alpha coefficients ranging from 0.707 to 0.760. Specifically, the highest value was registered for Action subscale (0.760), followed by Precontemplation (0.758), Contemplation (0.726) and Maintenance (0.707).

Discussion

A review of relevant theory and research literature revealed that no investigations have yet provided evidence for the validity and reliability of the University of Rhode Island Change Assessment Scale for general problem behaviors into the Italian language and no study, to date, has supported its specific use in measuring the readiness to change in a sample of obese or overweight subjects attending a nutritional rehabilitation program.

Table 4 Factor Loading of the IT-URICA items ($N = 334$)

Item	PC	C	A	M	R^2
1	0.534				0.285
5	0.790				0.624
11	0.818				0.668
13	0.864				0.746
23	0.275				0.076
26	0.649				0.422
29	0.461				0.212
31	0.682				0.465
2		0.629			0.396
4		0.778			0.606
8		0.818			0.670
12		0.701			0.492
15		0.790			0.623
19		0.539			0.291
21		0.567			0.321
24		0.696			0.485
3			0.545		0.297
7			0.882		0.778
10			0.698		0.488
14			0.682		0.466
17			0.663		0.439
20			0.684		0.467
25			0.652		0.425
30			0.757		0.574
6				0.730	0.532
9				0.356	0.127
16				0.358	0.128
18				0.551	0.304
22				0.685	0.469
27				0.805	0.647
28				0.541	0.293
32				0.570	0.325

Factor analysis techniques are commonly used by researchers to evaluate the internal structure of psychological scales and, to our knowledge, the present contribution is the first having conducted confirmatory factor analysis (CFA) only to test the dimensionality of the measure. In fact, while exploratory factor analysis (EFA) is essential to determine underlying constructs for a set of measured variables when researchers have few, if any, hypotheses about a scale's internal structure, CFA is particularly useful when researchers make use of strong knowledge of the theory, empirical research, or both, for postulating the relationship pattern a priori and then test the hypothesis statistically.

The results of this study provided support for the four-factor solution of the IT-URICA, supporting its application in TTM-based weight-management interventions.

More in detail, the precontemplation stage understandably did not appear to be correlated with the other factors, and this figure is in line with the original formulation of the TTM model, which describes Precontemplators as still looking at the process of change from the outside [8]. The Contemplations phase was, instead, positively related to both the Action and the Maintenance stages, and the Actions stage showed positive association with the Maintenance subscale only. A specifically high correlation coefficient resulted between the Contemplations and the Action stages ($r = 0.772$), and it may depend on the type of care setting in which the data were collected. Inpatients may, in fact, understand their voluntary choice to enter a 1-month rehabilitation program as action toward change itself. However, access to secondary prevention practice does not ensure long-term adherence to treatments.

Although the current work has potentially important implications for weight-management assessment and subsequent treatment interventions in overweight and obesity, some limitations are present. Firstly, the psychometric assessment was carried out in a clinical setting with a convenience sample of subjects enrolled in the treatment program, and it is not, therefore, representative of the general population of overweight/obese persons in Italy.

Also, since the role of the residential setting in influencing treatment outcomes cannot be excluded, test–retest reliability of the questionnaire has not been carried out. Thus, while the IT-URICA may represent a valid measure of the inpatients' RTC at pre-treatment, a more reliable assessment of persons' motivation, which would also provide predictive value to the tool, should be conducted at specific post-discharge follow-up points.

In fact, hospital care environments may act as motivational factor per se, but do not guarantee adherence to self-care after release. Also, a self-reported measure may always be susceptible to social desirability bias [28], and clinicians and researchers should always take into account that eating habits are particularly difficult to report: people do not always know where they are in relation to the action criteria, or what changes they need to make to reach their objectives. Individual preferences may also be incompatible with the ultimate goal of attaining healthy patterns [13] and being overweight/obese may sometimes represent a secondary gain associated with valid reasons for the person not to lose weight. Moreover, interpersonal relationships and common social situations play a crucial role in the etiology and maintenance of undesirable lifestyle habits in both clinical and nonclinical samples [13, 29].

Since relapse following treatment too often affects the individuals' self-esteem and negatively influences their life [30, 31], the need for effective prevention plans become, therefore, mandatory i to predict desirable life outcomes.

Conclusion

This work provides a unique contribution through the Italian translations and validation of the URICA for measuring RTC among inpatients suffering from weight problems, proving this instrument worthy of being used in research and clinical settings.

In fact, nutrition and physical activity educational interventions do not guarantee optimum lifestyle or reduction of body weight [32], and the majority of obese and overweight patients have been shown to regain about one-third of the weight lost with treatment within 1 year, going back to their original weight in 3–5 years after termination of the weight-loss program [33].

Motivational factors play an important role in promoting effective and efficient behavior changes [1, 34], and evidence has been found for the positive relationship between both TTM-based measures and interventions and patients' adherence to treatment [35]. Still, since motivational interventions have been demonstrated to be more effective when aimed at addressing a single and specific behavior (i.e., in the case of weight control, measuring the individuals' motivation to eat healthy instead of exercise regularly), the development of a stage of change measure specifically focused on a clearly and jointly defined behavioral goal may further help clinicians and other professionals to provide weight-specific intervention at various points during treatment as well as enhancing long-term weight-loss maintenance [13].

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Compliance with ethical standards

Conflict of interest The authors declare that there are no conflicts of interest.

Research involving human participants and/or animals All procedures performed in studies were run in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Written informed consent was obtained from all participants.

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