

Psychometric Properties of the Spanish Version of the Running Addiction Scale (RAS)

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Despite the growing number of Spanish people who organize their lives to prepare and participate in marathons, bringing to it a very committed lifestyle that, sometimes, go in detriment of their own health. In this instrumental paper, we the adaptation and testing of the psychometric properties of the *Running Addiction Scale* (RAS) in Spanish. To this end, we conducted two independent studies. The aim of the first was to present the first preliminary psychometric data (pilot sample of 174 marathon runners). Explained the process of translation, adaptation and content validity of items, we carried out a statistical analysis of these, an exploration of dimensional structure and analysis of the reliability of the instrument. In the second study (sample of 975 marathon runners), the aim was to analyze the internal structure of the instrument with confirmatory procedures. The Spanish version of the RAS showed acceptable levels of internal consistency, temporal stability, inter-item correlations and total scale score. Also provides evidences of construct validity. Slight differences were obtained by sex and age. These findings support the use of the Spanish version of RAS to assess individual differences in negative addiction to running.
Keywords: psychometric properties, Running Addiction Scale, Spain.

Considerando la creciente cantidad de personas que en España organizan sus vidas para prepararse y participar en maratones, llevando para ello un estilo de vida muy comprometido que, a veces, va en detrimento de su propia salud, en el presente trabajo nos planteamos evaluar la adaptación y comprobación de las propiedades psicométricas de la *Running Addiction Scale* (RAS) en castellano. Para ello, realizamos dos estudios independientes. El objetivo del primero fue presentar datos psicométricos preliminares (muestra piloto de 174 maratonianos). Expuesto el proceso de traducción, adaptación y validez de contenido de los ítems, se efectuó un análisis estadístico de éstos, exploración de la estructura dimensional y análisis de la fiabilidad del instrumento. En el segundo estudio (muestra de 975 maratonianos), el objetivo fue analizar con procedimientos confirmatorios la estructura interna del instrumento. La versión en español de la RAS mostró niveles aceptables de consistencia interna, estabilidad temporal, correlaciones inter-ítems y puntuación total de la escala. Igualmente, aporta evidencias de su validez de constructo. Se obtuvieron ligeras diferencias de sexo y edad. Estos hallazgos apoyan el uso de la versión en español de la RAS para evaluar las diferencias individuales en la adicción negativa a correr.
Palabras clave: propiedades psicométricas, Running Addiction Scale, España.

During the 1970s decade, the phenomenon of jogging and the figure of the marathoner became popular in the USA (Glasser, 1976; Kostrubala, 1977). Due to the changes of postmodernism in more advanced countries—such as the devaluation of work as a source of personal accomplishment in favor of activities to fill leisure time with play or sports (Águila Soto, 2005)—, this practice has also become popular in the Spanish society.

In many of its practitioners, the phenomenon of continuous running is associated with a theoretical construct called *commitment to running* (Carmack & Martens, 1979). Etymologically, the concept of commitment is defined in the dictionary of the Real Academia Española [Royal Spanish Academy] (2004) as a contracted obligation and, in the particular case of marathoners, the two variables that clearly define high commitment to their sport are a large number of training days and the number of kilometers they run weekly (Thornton & Scott, 1995).

It is noteworthy that, of all the athletes, marathoners are the ones with the highest commitment because, despite the fact that a much larger level of cardiorespiratory capacity and muscular resistance is required just to finish a race than is found in a normal healthy person, increasingly more people sign up for and finish marathons, raising their commitment to this sport modality to a level that Masters, Ogles, and Jolton (1993) called *super-adherence*. Thus, whereas approximately one half of the people who start a physical activity program drop out in the first six months, those who accept the challenge to prepare a marathon rarely drop out, and it is normally a part of their lives for many years. However, this super-adherence to their sport is often taken to such extremes that it is harmful for their quality of life (Ardila, 2003) because it deteriorates runners' social life, work, or even health, either at a physical (continuing to run against medical advice, when injured) or mental level (abstinence syndrome, anxiety and irritability if a training session is missed), turning into the construct that is the object of our study: the *negative addiction to running* (NAR).

These negative effects in runners' lives should not be taken lightly because stress-prone people who begin to practice continuous running as a method to improve their health can develop an obsessive pathological behavior with their commitment to running (Thornton & Scott, 1995); that is, a NAR, independently of their age or the number of years they have been running. Leedy (2000) reported the controversy concerning the psychological effects of running long distances because, although it has traditionally been prescribed as a parallel or alternative treatment to drugs for the improvement of depression and anxiety, running sometimes generates a NAR pathology.

As a consequence of these negative effects, many researchers have studied this construct that is characteristic of marathoners: the NAR. The first studies that refer to the concepts of addiction to continuous running go back to Glasser (1976), who differentiated the concept of positive addiction to running

(PAR)—understood as an activity that increases mental strength and, if individuals are deprived of it, they feel some kind of pain, suffering, or distress (physical or psychological)—from the concept of NAR. Positive addiction to running is pleasant but it does not dominate the person's life as in the case of NAR, so the latter could be comparable, for example, to the addiction to compulsive and irreflexive buying, according to García Ureta (2007). Positive addiction to running causes extreme pleasure, even euphoria, and mental effects that make the experience as pleasant as it is addictive. Glasser (1976) calls these mental effects spinning free, or running in a sort of pleasant, transcendental trance that accompanies exercise with positive addiction, and to reach this state, the person must run between 40 and 60 minutes (Kostrubala, 1977), attaining a feeling that this author calls runner's euphoria.

To better define the concept of PAR, Carmack and Martens (1979) compared it to the commitment to running (CR) in a study in which, besides developing and validating an instrument to measure it—the Commitment to Running Scale (CRS)—, they noted that runners with a higher degree of CR (= PAR) are male, with more than one year's dedication to continuous running during a minimum of three weekly sessions of at least 40 minutes, explaining that the pleasant feeling of euphoria associated with PAR is achieved by running and tuning out.

Using an analogous terminology, Pargman (1980) referred to two types of clearly differentiated runners. On the one hand, addict-dependent runners (with PAR) with a lower degree of adherence to continuous running, but who felt greater satisfaction when running and, on the other hand, the committed-dedicated runners (with NAR) with a high degree of adherence to continuous running although, due to external motivations such as, for example, medical prescription, so they do not usually enjoy running.

However, a specific instrument to measure NAR was not validated until one decade later, when Chapman and De Castro (1990) developed and validated the Running Addiction Scale (RAS), the instrument of reference to date to measure NAR. In their study, they also concluded that both sexes could have great CR, but that nonetheless women did not obtain such high NAR values as men.

In contrast, Dawson and Peco (2004), in a study in which they applied an instrument that contained a scale based on Carmack and Martens' (1979) CRS, Chapman and De Castro's (1990) RAS, and a series of questions about the runners' weekly number and type of training sessions, finding a positive relation between CR and NAR, so that higher CR indicated a higher degree of NAR. Moreover, although they found no significant sex differences at the construct level, these constructs were significant predictors of a higher number of weekly training sessions in males but not in females.

The psychometric characteristics of the RAS proceed from the original study (Chapman & De Castro, 1990), and to date, it is the only reference on which to base judgments of these properties. Both the structure of the scale and its reliability (see the Instrument section) are psychometrically adequate.

In the literature, we found instruments to measure similar constructs, such as the Exercise Dependence Questionnaire (EDQ; Ogden, Veale, & Summers, 1997), which measures dependence on exercise in general, but in view of the lack of specific studies of marathoners' NAR and of an adequate instrument to measure such constructs in Spanish, the goal of this work is the adaptation and confirmation of the psychometric properties of the original instrument of Chapman and De Castro (1990) in sample of our environment and culture (Spain). This validation process will also serve to enrich the still insufficient data about the psychometric guarantees of the original version because, methodologically, certain guidelines are required that were not strictly followed in the work that led to the RAS.

For example, the sample sizes of the original pilot study ($n = 5$) and of the total sample of the study that produced the RAS ($n = 56$) are insufficient because, as recommended by Osterlind (1989), there should be between 50 and 100 participants for a pilot study and at least 300 for a final study. Moreover, the authors did not strictly follow the succession of pertinent reference analyses to obtain sufficient evidence of the validity of the RAS. We refer to those explained by Carretero-Dios and Pérez (2005, 2007) for the elaboration of instrumental studies, which we followed in our study.

Our work presents the results of two independent studies. In the preliminary study, using a pilot sample of 174 marathoners, after presenting the process of translation and adaptation of the items and the data related to the evidence of their content validity, we carry out the statistical analysis of the items, we explore the dimensional structure of the test, and we conduct a reliability analysis of the instrument. In the second study, with a total sample of 975 marathoners of similar characteristics to those of the pilot study, by means of confirmatory procedures, we analyze the structure of the instrument, its construct validity, internal consistency, and temporal stability. Moreover, as we collect data about sex and age in the second study to analyze NAR differences in these two variables, we obtain new evidence of the validity of the Spanish version of the RAS.

For this purpose, on the basis of this literature review, we propose the hypothesis that, in our population, both men and women have similar NAR levels, and, likewise, runners of different ages do not necessarily present significant differences with regard to NAR; that is, neither age nor sex are variables that significantly affect the degree of NAR in Spanish marathoners.

Study 1: Preliminary psychometric study of the RAS

Method

Participants

A total of 174 runners (163 men = 93.8%, 11 women = 6.3%), who were also participants in the marathon of

Ciudad Real (Spain) on October 26, 2008, took part in the study. Their age ranged between 22 and 68 years ($M = 41.29$, $SD = 8.10$), with mean age for men of 41.60 ($SD = 8.15$) and for women of 36.73 ($SD = 5.76$).

Instrument

Running Addiction Scale (RAS) (Chapman & De Castro, 1990). The original 11-item instrument was designed to measure the negative addiction to running. Participants rate their responses on a 7-point Likert-type scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), and the total RAS score ranges between a minimum score of 11 (minimal addiction to running) to a maximum score of 77 (maximum addiction to running). Internal consistency for the scores of the total scale in the original study was .82.

Translation and prior phases of the adaptation process of the RAS to Spanish

Firstly, we checked item equivalence in the translation process. The Spanish adaptation of the RAS was carried out following the international methodological standards recommended by the International Test Commission (ITC) to correctly adapt tests and scales from one culture to another (Hambleton, 2005; Muñiz & Bartram, 2007; Muñiz & Hambleton, 2000). In order to avoid inaccuracy, we combined direct and backward translation of the items (Brislin, 1970, 1986). Firstly, following the parallel back-translation procedure (Brislin, 1986), the scale was independently translated from English (the original language) to Spanish by two bilingual translators. Next, the two translations were compared and any possible discrepancies were discussed and a consensuated version of all the items was obtained. Using this version, a backward translation (Spanish to English) was carried out by two different native bilingual translators with extensive knowledge of both the target and the source language, and who were not familiar with the original scale. The adequacy of the translation was judged as a function of the degree of coincidence with the original version (Hambleton, 2005), and some of items were changed as a result.

The qualitative assessment of the items (content validity) was performed by expert judges (Osterlind, 1989). This was carried out by four experts (two experts in scale construction and two experts who were familiar with the construct to be assessed). They received a table with the specifications of the items (Calabuig & Crespo, 2009; Spaan, 2006), and the semantic definition of the construct to be assessed and its components. Next, the list of items that had been designed to assess addiction to running was presented, and they were requested to judge whether or not each item belonged on the list. Subsequently, they appraised the drafting of each item to determine whether the items were comprehensible; thus, the judges rated the

adequate comprehension of each item by means of a scale ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). There was also a section in which they could make general observations about each item, so they could draft an alternative if they deemed it appropriate. All the items that obtained mean scores lower than 3 were reviewed (Nuviala, Tamayo, Iranzo, & Falcón, 2008).

Lastly, to determine the clear formulation of the items, the Spanish version of the scale was applied to 24 marathoners, whose comments about the instructions and the way the items were drafted led to minor changes. Finally, this last version was administered to a sample of 174 marathoners. After analyzing the psychometric results and a last review by the research team, we obtained the final Spanish version of the RAS.

Procedure

We requested the race organization permission to apply the instrument by means of a letter in which we explained the goals of the investigation, how it would be carried out, including a model of the instrument. They granted us permission to administer the instrument and placed a stand at our disposal for this purpose. The questionnaire was administered by the researchers when the participant athletes

collected their dorsals (race numbers) the day before the race. All the subjects were informed of the goals of the study, and of the voluntariness, and complete confidentiality of their responses and data treatment. They were also informed that there were no right or wrong responses and they were requested to answer with the maximum sincerity and honesty.

Results

Analysis of the Scale Items

We followed an analysis procedure according to the recommendations of Carretero-Dios and Pérez (2005). Firstly, we conducted the statistical analysis of the scale items, maintaining the distribution of the original instrument (Chapman & De Castro, 1990). The criteria to maintain an item were: a corrected item-total correlation coefficient value higher than or equal to $r = .30$, a standard deviation higher than 1, and the corroboration that all the response options had been used at some time (Nunnally & Bernstein, 1994/1995). We calculated the reliability of the scale with the internal consistency index, Cronbach's alpha, which proved adequate ($\alpha = .79$).

Table 1

Mean (*M*), Standard Deviation (*SD*), Item-total Correlation (*R IT-c*), Alpha of the Theoretical Scale, and the Dimension if an Item is Eliminated (α without the Item) ($n = 174$)

	<i>M</i>	<i>SD</i>	<i>R IT-c</i>	α without the item
1. Suelo correr por los mismos sitios, a las mismas horas, igual distancia, etc.	4.63	1.33	.15	.83
2. Si el clima es demasiado frío, caluroso o ventoso, no correré ese día (R)	5.18	1.35	.61	.69
3. No cambiaría planes con los amigos para poder ir a correr (R)	4.83	1.79	.54	.73
4. He dejado de correr al menos durante una semana por otra razón que no fue una lesión (R)	4.66	1.99	.51	.75
5. Correría con dolor intenso	2.72	1.97	.22	.82
6. No he gastado mucho dinero en literatura sobre footing o en equipamiento y accesorios para correr (R)	2.97	1.75	.21	.82
7. Si hubiese otra manera de mantener mi forma física actual, no correría ninguna vez más (R)	5.64	1.59	.53	.74
8. Después de correr me siento mejor	6.88	1.36	.61	.70
9. Continuaría corriendo mientras una lesión se me cura	3.49	1.88	.41	.78
10. Algunos días, incluso si no me apetece correr, lo hago de todas maneras	5.15	1.71	.65	.68
11. Siento que necesito correr al menos una vez todos los días	4.39	1.95	.50	.75

Internal consistency index of the scale: $\alpha = .79$.

Note. (R) The score of these items is reversed. Shaded items were eliminated from the scale.

[Translator's note: The scale items have not been translated because this is the Spanish version of a scale originally published in English.]

Table 2

Factor Structure, Communalities, Percentage of Variance Explained, Eigenvalue, and Cronbach's Alpha of the RAS (n = 174).

	Addiction to running	H ²
2. Si el clima es demasiado frío, caluroso o ventoso, no correré ese día (R)	.60	.56
3. No cambiaría planes con los amigos para poder ir a correr (R)	.46	.41
4. He dejado de correr al menos durante una semana por otra razón que no fue una lesión (R)	.44	.39
7. Si hubiese otra manera de mantener mi forma física actual, no correría ninguna vez más (R)	.51	.48
8. Después de correr me siento mejor	.58	.54
9. Continuaría corriendo mientras una lesión se me cura	.39	.35
10. Algunos días, incluso si no me apetece correr, lo hago de todas maneras	.63	.62
11. Siento que necesito correr al menos una vez todos los días	.43	.38
% Explained variance	49.51	
Eigenvalue	3.97	
Cronbach's alpha	.82	

Note. (R) The score of these items is reversed.

The scale had items with mean response values that ranged between 2.72 (Item 5) and 6.88 (Item 8), and the standard deviations were higher than 1, ranging between 1.33 (Item 1) and 1.99 (Item 4). There were very low values of corrected item-total correlations in three of the items (Item 1, $r = .15$, Item 5, $r = .22$, and Item 6, $r = .21$) so we decided to eliminate them (see Table 1). We recalculated the reliability of the scale with eight items, and Cronbach's alpha increased to .82.

Analysis of scale homogeneity

We calculated the correlation between the total scale score (with the three above-mentioned items eliminated) and the eight scale items. The values ranged between a minimum of $r = .58$ and a maximum of $r = .73$ ($p < .01$). Likewise, we calculated an inter-item correlation, obtaining an acceptable positive correlation between the diverse items (Carretero-Dios & Pérez, 2005), with values between $r = .16$ and $r = .39$.

Analysis of the internal structure of the scale

The skewness and kurtosis indexes were close to the value zero and < 2.0 , as recommended by Bollen and Long (1994). We calculated the Kaiser-Meyer-Olkin sample adequacy measurement ($KMO = .81$) and Bartlett's sphericity test, $\chi^2(28, N = 174) = 813.103$, $p < .001$. We performed exploratory factor analysis of the 8 items selected, using the maximum likelihood extraction method. The results showed that the items were grouped into a single factor (Eigenvalue = 3.97), which explained 49.71% of the total variance (see Table 2).

Therefore, the final Spanish version of the RAS scale is made up of eight items (see Table 3) that refer to the negative addiction to running. The responses about their running habits are also rated on a 7-point Likert-type scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The scores of Items 1, 2, 3, and 4 are reversed.

Study 2: Confirmatory Factor Analysis, construct validity, internal consistency, and temporal stability

The goal of this study was to contribute evidence of the dimensionality of the RAS in a sample marathoners, applying confirmatory analysis procedures. We shall analyze the psychometric properties of the Spanish version of the RAS with five specific goals: (a) to examine the factor structure of the RAS in a sample of marathoners through confirmatory factor analysis; (b) to assess the construct validity from the correlations between the eight items of the RAS; (c) to assess the internal consistency of the RAS; (d) to verify the temporal stability of the scale; and (e) to assess sex and age differences from the means obtained in the RAS.

Method

Participants

The RAS was administered to 975 marathoners in the races of San Sebastián (November 30, 2008), Seville (February 22, 2009), and Barcelona (March 1, 2009). The

Table 3

Mean (*M*), Standard Deviation (*SD*), Item-total Correlation (*R IT-c*), Alpha of the Theoretical Scale and the Dimension if an Item is Eliminated (α without the Item), Skewness, and Kurtosis ($n = 975$).

	<i>M</i>	<i>SD</i>	<i>R IT-c</i>	α without the item	Skewness	Kurtosis
1. Si el clima es demasiado frío, caluroso o ventoso, no correré ese día (R)	5.44	1.58	.62	.68	-.40	.65
2. No cambiaría planes con los amigos para poder ir a correr (R)	4.78	1.76	.58	.72	.57	-.51
3. He dejado de correr al menos durante una semana por otra razón que no fue una lesión (R)	4.88	2.05	.53	.79	.59	-1.04
4. Si hubiese otra manera de mantener mi forma física actual, no correría ninguna vez más (R)	5.75	1.54	.54	.78	-1.03	1.18
5. Después de correr me siento mejor	6.34	1.17	.60	.70	-1.09	1.29
6. Continuaría corriendo mientras una lesión se me cura	3.57	1.90	.48	.83	.15	-1.11
7. Algunos días, incluso si no me apetece correr, lo hago de todas maneras	5.02	1.65	.63	.67	-.71	-.24
8. Siento que necesito correr al menos una vez todos los días	4.27	1.93	.58	.72	.17	-1.06

Internal consistency index of the scale: $\alpha = .84$.

Note. (R) The score of these items is reversed.

sample was made up of 915 men (93.8%) and 60 women (6.2%), age range between 17 and 71 years (total sample: $M = 39.67$, $SD = 8.53$; men: $M = 39.66$, $SD = 8.61$; women: $M = 39.88$, $SD = 7.39$).

To assess temporal stability of the RAS, 30 runners (10 from each marathon) were randomly selected from among those who had provided their e-mail address, and we sent them the questionnaire nine weeks later. Of them, 21 marathoners (19 men, 2 women) mean age 44.2 years ($SD = 10.05$) responded, thus completing the RAS for the second time.

Instruments

The Spanish version of the RAS derived from Study 1 was used (see Table 3). We collected sociodemographic data such as sex and age.

Procedure

We used the same procedure described in Study 1.

Results

Initial description of the data of the Spanish version of the RAS

In Table 3 are shown the descriptive statistics of the eight items of the Spanish version of the RAS (mean,

standard deviation, item-total correlation, alpha if an item is eliminated, skewness, and kurtosis). Firstly, statistical analysis of the eight items of the scale was performed in order to confirm the results of Study 1. The descriptive data (mean, standard deviation, and response range) were similar to those found in Study 1. The corrected item-total correlation indexes were adequate, as the minimum value is $r = .48$ (see Table 3).

Confirmatory Factor Analysis (CFA) of the Spanish version of the RAS

We applied structural equation models to determine whether, from a confirmatory perspective, the dimensions proposed theoretically by Chapman and De Castro (1990) fit the data obtained with the sample employed. The factor structure of the RAS was assessed with CFA, using the AMOS 7.0 program to determine the construct validity. A frequent error when performing CFA is to not take the normality of the data into account multivariately (Byrne, 2001). It is common for univariate analysis to reveal values indicating a normal distribution, but this changes when the distribution is analyzed multivariately, which is what we did in our model, because a Mardia's coefficient (7.24) higher than 2 indicates a lack of multivariate normality in the data, which violates one of the basic assumptions for CFA. There are several techniques to correct this: to use an estimation method that is not affected by the lack of normality or to use strategies that do not require multivariate normality. We chose the latter technique, using maximum likelihood

Table 4
Means (M), Standard Deviations (SD) and Significance (p-Value) of the Total Score and of the RAS Items as a Function of Sex (t-test) and Age Groups (ANOVA).

Items	Men (n = 915)		Women (n = 60)		Levene's test	t	17-35 years (n = 273)		36-40 years (n = 234)		41-45 years (n = 175)		46-50 years (n = 137)		Over 50 years (n = 156)		Levene's test	F
	M	SD	M	SD			M	SD	M	SD	M	SD	M	SD	M	SD		
1. Si el clima es demasiado frío, caluroso o ventoso, no correré ese día (R)	5.43	1.57	5.50	1.69	.68	-.31	5.40	1.67	5.58	1.50	5.50	1.48	5.23	1.60	5.40	1.63	1.49	1.24
2. No cambiaría planes con los amigos para poder ir a correr (R)	4.73	1.75	5.42	1.80	.00	-4.91**	4.67	1.79	4.92	1.74	4.88	1.75	4.71	1.71	4.67	1.78	.48	.96
3. He dejado de correr al menos durante una semana por otra razón que no fue una lesión (R)	4.88	2.15	4.92	2.25	.57	-.14	4.59	2.24	4.87	2.08	4.99	2.10	4.84	2.18	5.38	2.07	2.00	3.21**
4. Si hubiese otra manera de mantener mi forma física actual, no correría ninguna vez más (R)	5.75	1.54	5.68	1.54	.85	.32	5.68	1.53	5.75	1.60	5.97	1.32	5.55	1.71	5.79	1.49	1.51	1.68
5. Después de correr me siento mejor	6.33	1.17	6.50	1.08	1.49	-1.11	6.31	1.18	6.40	1.05	6.34	1.16	6.27	1.25	6.33	1.26	.57	.37
6. Continuaría corriendo mientras una lesión se me cura	3.56	1.88	3.70	2.12	3.01	-.54	3.61	1.87	3.58	1.89	3.86	1.93	3.39	1.87	3.28	1.91	.16	2.17
7. Algunos días, incluso si no me apetece correr, lo hago de todas maneras	4.99	1.66	5.47	1.44	.50	-4.16*	4.91	1.74	5.03	1.56	5.15	1.66	5.00	1.66	5.07	1.62	1.45	.60
8. Siento que necesito correr al menos una vez todos los días	4.26	1.93	4.45	1.96	.03	-.74	4.28	1.93	4.34	1.97	4.27	2.00	4.07	1.89	4.32	1.86	.59	.48
Total score of the RAS, Spanish version	30.34	4.44	30.60	4.27	1.50	-1.71	30.77	4.60	30.24	4.18	30.27	4.50	30.39	4.59	29.75	4.21	1.13	2.05

* p < .05. ** p < .01.

estimation, the *bootstrapping* technique, and the procedure of maximum similarity (West, Finch, & Curran, 1995).

The fit of the model was assessed by a combination of absolute and relative fit indexes (Bentler, 1995). The model presented correct values that allowed us to determine the acceptable goodness of fit of the original model (Browne & Cudeck, 1993; Hoyle, 1995; Hu & Bentler, 1999; Jöreskog & Sörbom, 1993; Kline, 1998; Shumacker & Lomax, 1996), as the following values were obtained: $\chi^2/df = 4.07$, the goodness-of-fit index (GFI = .88), the incremental fit index (IFI = .90), the comparative fit index (CFI = .90), the Tucker-Lewis index (TLI = .88), the standardized root mean square residual (SRMR = .05), and the root mean square error of approximation (RMSEA = .07). The standardized coefficients of the relation of the latent variable (RAS) with each one of the items ranged between .59 and .88.

Analysis of the reliability of the Spanish version of the RAS

We conducted an analysis of the reliability with Cronbach's alpha coefficient. The results revealed an alpha coefficient of .84 for the factor Addiction to Running.

Temporal stability was assessed in a sample of 21 marathoners who completed the RAS twice, with a 9-week interval. The results of the pretest was $\alpha = .82$, and of the posttest $\alpha = .85$, and the test-retest correlation was $r = .81$.

Inter-item correlations in the Spanish version of the scale

We calculated the inter-item correlations, obtaining an acceptable positive correlation among the diverse items (Carretero-Dios & Pérez, 2005), with values ranging between $r = .17$ and $r = .41$. Likewise, we calculated the correlation between the total scale score and the items that comprise it, obtaining values ranging between a minimum of $r = .57$ and a maximum of $r = .79$ ($p < .01$).

Sex and age differences of the Spanish version of the RAS

We carried out an analysis of sex differences (see Table 4) as a function of the mean scores in the eight items and of the total score in the Spanish version of the RAS, using t-test, and taking into account Levene's test to estimate variance equality with a level of significance of $p < .01$, with all the items meeting homogeneity criteria. The results yielded significant differences only in Items 2 and 7 ("I wouldn't change plans with friends to go running," and "Some days, I run even if I don't feel like it"), with the women obtaining higher scores than the men, although the effect size was small ($r_2 = .18$ and $r_7 = .14$). In the total scale, as with the rest of the items, no statistically significant differences were found.

To analyze age, we categorized this variable into five groups coinciding with the age categories of the Royal Spanish Athletic Federation: up to 35 years (senior category), from 36 to 40 years (veterans' category M-35 in men and W-35 in women), from 41 to 45 years (veterans M-40 and W-40), from 46 to 50 years (veterans M-45 and W-45) and = or > 50 years (veterans M-50 and W-50 and so on). The assumption of variance homogeneity (homoscedasticity) was met in all the items ($p < .01$, see Table 4), which, along with the fact that the samples are large and more or less balanced, allows the use of ANOVA, and Bonferroni as post-hoc test. The ANOVA of Item 3 ("I have stopped running for at least a week due to a reason other than an injury") was significant, $F(4, 970) = 3.219$, $p = .012$. The only differences were found between the youngest (17-35 years, $M = 4.59$) and the older runners (= or > 50 years, $M = 5.38$) (post-hoc Bonferroni). The effect size was low ($r_3 = .22$). In the rest of the items and in the total score of the RAS, no statistically significant differences were obtained.

Discussion and Conclusions

Since a little more than 30 years ago, international researchers from the field of psychology have treated marathoners—the population most highly committed to their sport—for addiction to its practice (Carmack & Martens, 1979; Chapman & De Castro, 1990; Dawson & Peco, 2004; Glasser, 1976; Kostrubala, 1977; Leedy, 2000; Masters et al., 1993; Pargman, 1980; Thornton & Scott, 1995). However, although it is also undoubtedly relevant for Spanish investigators, the absence of any research in our language and context as well as of specific instruments to measure NAR are truly remarkable, and this latter fact justifies the need for our study. Therefore, the goal achieved in the present instrumental work consisted of the adaptation and verification of the psychometric properties of the original instrument, the RAS of Chapman and De Castro (1990), to Spanish with samples from our environment and culture. It is noteworthy that the data concerning the psychometric guarantees of the original version are insufficient to obtain the theoretical structure of the original scale, which has nonetheless been accepted. Thus, for our study, we followed the current reference rules explained by Carretero-Dios and Pérez (2005, 2007) for the development and review of instrumental studies. Whereas, in the original study, the authors used an 11-item scale to assess NAR, and in our work, we used an 8-item scale that presented correct values, which allowed us to determine the acceptable goodness of fit of the original model and, moreover, the scale in Spanish (RAS-8) obtained an internal consistency index that slightly exceeded that of the original RAS. Thereby, with the RAS-8, total scores that range between 8 (minimum NAR) and 56 points (maximum NAR) can be obtained.

Regarding its applications, we analyzed the NAR sex and age differences, finding no significant differences in the total score of the scale, as predicted in our hypothesis and in accordance with the investigators of the most recent studies regarding sex (Dawson & Peco, 2004) and age (Thornton & Scott, 1995), which contributes more evidence of the validity of our instrument.

A vast field of research possibilities is open to future research, as suggested in the literature consulted. In addition to applying the RAS-8, researchers can collect data about other comparative variables of interest, such as the personal marathon level, number of years running, economic or educational level, training days or kilometers covered each week, as well as the degree of commitment and the reasons for running, which would contribute new and valuable evidence of the validity of the RAS-8.

Lastly, we have adapted a very relevant instrument to the Spanish language, obtaining adequate psychometric properties with a very representative sample, and this fills the gap in the knowledge of this field of sports psychology research. However, we think it is important to perform more studies with different samples of diverse provenances, to continue to obtain more evidence from various sources of validity.

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