Psychometric properties and dimensionality of the "*Flourishing Scale*" in Spanish-speaking population

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Abstract

Introduction. Flow has recently been the focus of research with students in regard to its relation to diverse academic and motivational variables in different educational settings. This brings out the need of more and better tools for evaluation of this construct for the Spanish speaking population. The goal of this study was to validate a Spanish version of the "Flourishing Scale" (FS) in Spanish and Colombian university students.

Method. A total of 359 students took part, 152 from Bogotá (Colombia) and 207 from Spain, whom responded to an online questionnaire. Two types of complementary statistical analyses were carried out. One of them was the Rasch model with which was analyzed the adjustment for each one of the items, its difficulty and established the fit for the rank of the scales used in the questionnaire. The other one was a confirmatory factor analysis with which the dimensionality of the construct was corroborated and its invariance in the two samples used, by means of a multi-group analysis.

Results. These results confirm the one-dimensional characteristic of flow, which were invariant in both samples. Through the Rasch Model, good rates of reliability and validity of the FS were observed.

Discussion. The properties of the FS are satisfactory, although it would be desirable to introduce items with a higher level of difficulty for people with high levels of flow. Finally, the reduction of the scale to four categories will increase the parsimony of the scale and its functionality.

Keywords: flow; college students; validation; cross cultural research; multi-group analysis.

Propiedades psicométricas y dimensionalidad de la "*Flourishing Scale*" en población hispanohablante

Resumen

Introducción. El flujo o estado de flujo ha empezado a investigarse con estudiantes en cuanto a su relación con diversas variables académicas y motivacionales en diferentes entornos educativos. Esto conlleva la necesidad de más y mejores herramientas para la evaluación de este constructo en la población hispanohablante. El propósito de este estudio fue la validación de la versión en castellano de la *Flourishing Scale* (FS) en universitarios españoles y colombianos.

Método. Formaron parte del estudio un total de 359 estudiantes, 152 de Bogotá (Colombia) y 207 de España, quienes respondieron a un cuestionario en línea. Se realizaron dos tipos de análisis estadísticos complementarios. Uno mediante el modelo Rasch, con el cual se analizó el ajuste de cada una de las preguntas, su dificultad y se estableció la adecuación del rango de la escala empleada en el cuestionario. El otro fue un análisis factorial confirmatorio con el cual se corroboró la dimensionalidad del constructo y su invarianza en las dos muestras empleadas mediante un análisis multigrupo.

Resultados. Los resultados confirman la unidimensionalidad del constructo flujo medido con la FS, el cual fue invariante para las dos muestras. A través del modelo Rasch se obtuvieron buenos niveles de confiabilidad y evidencia de validez de la escala FS.

Discusión. Las propiedades de la FS son satisfactorias, aunque puede ser recomendable la incorporación de nuevas preguntas con un mayor nivel de dificultad para personas con altos niveles de flujo. Finalmente, la reducción de la escala de respuesta a cuatro categorías podría aumentar la parsimonia de la escala y su funcionalidad.

Palabras clave: flujo; universitarios; validación; estudio transcultural; análisis multigrupo.

Introduction

Flow could be defined as a combination of subjective and psychological well-being (Diener et al., 1999). This construct has currently become an important focus of research, especially since the studies within the framework of positive psychology (Balducci, et al., 2010; Littman-Ovadia & Balducci, 2013; Schaufeli et al., 2002; Seligman & Csikszentmihalyi, 2000).

Seligman (2011) refers to flow as a combination of a set of "central features": positive emotions, engagement, meaning (sense and purpose); and "additional features": self-esteem, optimism, resilience, vitality, self-determination and positive interpersonal relations. The above-mentioned features seem to contribute to the fact that individuals with Flow learn more efficiently, have more and better social relations, experience fewer limitations in their daily activities and enjoy better health (Huppert & So, 2013). In fact, the scale presents significant positive correlations with other well-being measures (Silva & Caetano, 2013).

Flow dimensionality

The dimensionality of flow is an essential aspect and it is still much debated. It is relevant for the understanding of its relation with optimal learning, and because it is considered a good predictor of academic performance (Shernoff et al., 2003). Salanova et al. (2002) operationalized flow as a function of three factors: competence, absorption, and intrinsic motivation. In contrast, other authors address it as having just two factors: enjoyment and absorption (Rodríguez et al., 2008); and other studies defend the one-dimensional characteristics of this construct (Diener et al., 2009; Hone et al., 2013).

Among the studies defending the one-dimensional characteristics, Diener et al. (2009) applied the "Flourishing Scale" (FS; Diener & Biswas-Diener, 2008) to 689 students. More recently, this scale was also applied to 9,646 New Zealander adults. Both Exploratory Factor Analysis (EFA) and CFA indicated the one-dimensional characteristics of flow, also showing very good reliability and validity results (Hone et al., 2013). Also, Silva and Caetano (2013) found evidence of the one-dimensional feature of this construct in the validation study of the FS in Portuguese. So far, there is no evidence of validation studies performed with the FS in Spanish speaking regions, and so the psychometric behavior is unknown on these populations.

Aims and hypothesis

The purpose of the present study was to validate the Spanish version of the FS (Melipillán et al., manuscript not published), translated to Spanish from the original one by Diener et al. (2009), adopting it to two samples of university students from Spain and Colombia. We provide evidence of its psychometric goodness, metric invariance in the two samples and dimensionality. The FS has not been adapted to either of the mentioned populations, so it was assumed in this study that a single invariant concept is being measured. Specifically, we proposed the following hypotheses:

1.   The FS presents adequate psychometric properties regarding internal consistency, and the reliability and validity indices of the items for the two samples used.

2.   The construct of flow, as measured by means of the FS, is one-dimensional.

3.   The one-dimensional structure of flow is invariant in the two samples.

Method

Participants

The sample of this study consisted of 359 students, 152 from a university in Bogotá (Colombia) and 207 from a university in Almería (Spain). The gender distribution was as follows, 68% women and 32% men, and the average age was 22 years. The students were enrolled in courses of Psychology, Health, Education, and Engineering. In the case of the Spaniards, 49% were in their 4th year. There was more variability in the Colombian students sample. The largest proportion was in their third semester (33%), followed by those in the second (27%) and first semesters (20%).

In relation to the academic performance outcome, over 80% of the participants stated that they took all the exams during the different academic courses. In both groups, the mean grades achieved were very similar (7.13 for Spaniards and 7.44 for Colombians).

Instruments

In the Spanish version, the state of flow was analyzed by means of the FS (Diener & Biswas-Diener, 2008; Diener et al., 2009), see Table 1. It has eight items rated on a Likert-type response format, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The FS was created to assess self-perceived success in areas such as relationships, feelings of competence, purpose, and optimism. The scale provides a single psychological well-being score and has good psychometric properties: the Cronbach alpha of the scale is good (.87), and the temporal reliabilities are moderately high (.71). It is strongly associated with other scales of psychological well-being and feelings (Diener et al., 2009).

Table 1. **Items of the FS (Spanish and English Version)**

Item	FS
Flow1	I lead a purposeful and meaningful life
	Llevo una vida útil y significativa
Flow2	My social relationships are supportive and rewarding
	Mis relaciones sociales me brindan apoyo y gratificación
Flow3	I am engaged and interested in my daily activities
	Me siento involucrado e interesado en mis actividades cotidianas
Flow4	I actively contribute to the happiness and well-being of others
	Contribuyo activamente a la felicidad y bienestar de otros
Flow5	I am competent and capable in the activities that are important to me
	Soy competente y capaz en las actividades que son importantes para mí
Flow6	I am a good person and live a good life
	Soy una buena persona y vivo una buena vida
Flow7	I am optimistic about my future
	Soy optimista acerca de mi futuro
Flow8	People respect me
	Las personas me respetan

Procedure

An analysis of the content of the questionnaire was performed but there was not a need to make adjustments on the vocabulary or terms used for both countries. Two experts from Colombia and Spain carried out this process. We used an on-line questionnaire, containing *ad hoc* items concerning socio-demographic and educational variables. A link to the questionnaire was sent to the students by e-mail. During this phase, we used the Lime Survey application (version 9.1.).

Data analysis

First, a series of descriptive analyses of the scores of the FS was performed, independently for the two countries (Colombia and Spain). The results obtained were analyzed using IBM SPSS software (version 22 for Windows).

Second, we also analyzed the scores obtained in the FS by the Colombian and Spanish samples by applying the Rasch model. This model presents some advantages for the validation of psychometric instruments (Baghaei, 2012). We collected evidence of reliability (person, item and Cronbach's alpha) and validity (item statistics, one-dimensional test, item map, and analysis of the response options).

Finally, to verify the models established by the Hypotheses 2 and 3, we applied CFA by means of structural equations, using for this purpose, the AMOS software. Its utility to establish the dimensionality of the construct is proven (De la Fuente et al., 2010). Initially, we performed the analyses in each sample and subsequently, we conducted a multi-group analysis to corroborate model invariance in the two samples.

We identified the values of the parsimony fit indices, which are the normed chi square (CMIN/*df*), and the root mean square error of approximation (RMSEA), as well as the comparative fit indices (CFI), the goodness-of-fit index (GFI), and the normed goodness-of-fit index (NFI). Values higher than 0.9 for CFI, GFI, and NFI, as well as lower than 0.08 for RMSEA and lower than 2 for CMIN/*df* are indicators of a good fit of the model. To assess the fit in the multi-group analysis, RMSEA and especially the difference between the CFI (lower or equal to -.01) and Tucker-Lewis indices (TLI lower or equal to .05) were taken into account.

Results

Descriptive analysis

In regard to the FS, the results of the descriptive analyses by item for the two samples, present scores close to the mid-point, although with a tendency toward higher values (there is no ceiling effect). The descriptive statistics of the FS yielded a slightly higher mean in the Colombian sample (4.2) than in the Spanish sample (4.0) (see Table 2).

Table 2. **Mean and Standard Deviation of the FS for the Two Samples by Country**

Country	*Tool*	*M*	*SD*	*n*
Spain	FS	4.02	.59	207
Colombia	FS	4.21	.62	152

Psychometric analysis of the FS by means of the Rasch model

The Rasch person reliability was fairly acceptable (Colombia = .77; Spain = .80), and the person separation statistic was 1.83 for Colombia and 2.02 for Spain. Rasch item reliability was .93 for Colombia and .94 for Spain, and the item separation statistic was 3.69 for Colombia and 4.13 for Spain. Also in both samples, the Cronbach alpha values were higher than .70 (Nunnally & Bernstein, 1994), (Colombia = .88; Spain = .85).

With regard to the estimated infit and/or outfit statistics, all the items of the FS fit the Rasch model (.13 - 1.4) in the two samples. The correlation of each one of the 8 items of the test was r ≥.6; the estimation error of each one of the 8 items fell within the range of .14 to .16 (see Tables 3 and 4).

Table 3. **FS Items According to the Rasch Model (Colombian Students)**

Item	*MEASURE*	*ERROR*	*IN. MSQ*	*OUT. MSQ*	*PT-ME*
Flow1	.30	.14	.83	.86	.74
Flow2	.84	.13	1.09	1.17	.72
Flow3	.48	.14	.78	.77	.75
Flow4	.38	.14	1.23	1.23	.65
Flow5	-.57	.16	.98	.96	.67
Flow6	-.80	.16	.87	.88	.67
Flow7	-.80	.16	1.17	.92	.68
Flow8	.17	.15	1.12	1.11	.67

Note: "IN.MSQ" and "OUT.MSQ" stand for "Infit Mean Squared" and "Outfit Mean Squared." PT-ME means bi-serial correlation, which is a correlation between the measure and the measure minus a specific item.

Table 4. **FS Items According to the Rasch Model (Spanish Students)**

Item	MEASURE	ERROR	IN. MSQ	OUT. MSQ	PT- ME
Flow1	.40	.11	.91	.91	.72
Flow2	-.27	.12	1.11	1.12	.64
Flow3	.16	.11	.79	.79	.71
Flow4	-.08	.12	.90	.98	.66
Flow5	-.58	.13	1.04	1.04	.60
Flow6	-.70	.13	.84	.79	.69
Flow7	.99	.10	1.33	1.35	.70
Flow8	.09	.12	.88	.84	.68

Note: "IN.MSQ" and "OUT.MSQ" stand for "Infit Mean Squared" and "Outfit Mean Squared." PT-ME means bi-serial correlation, which is a correlation between the measure and the measure minus a specific item.

The measure explained 52.1% of the variance; the first contrast did not explain 10.1% of the residual variance. The first contrast had 1.7 *eigenvalues* for the residual variance. The ratio between the percentage of total variance explained by the items and the percentage of variance not explained by the first residual was 5.15, suggesting that the test measures a single construct.

The Wright map (see Figures 1 and 2) presents the Rasch rule in the range from -1 to +5 for both samples. The mean for person skill was 2.56 (*SD* = 1.93) for the Colombian sample, and 2.09 (*SD* = 1.75) for the Spanish sample; the mean item difficulty was .00 (*SD* = .59) for the Colombian sample, and .00 (*SD* = .51) for the Spanish sample. In the Wright item map, person skill, and item difficulty means are more than 2 logits away from (2.56 in the case of Colombia and 2.09 in the case of Spain) the difference of their values, indicating that there are some levels of attribute not covered by the items in the population.

The response options present a frequency higher than 10 (Bond & Fox, 2007) with monotonic progression from one category to the next (from -2.85 for Category 1, to 4.09 for Category 5 in the case of the Colombian sample, and from -3.41 to 4.26 for the Spanish sample). The values of the far and near fit statistics are between ≥.8 and ≤1.3 in the two samples, but the distance between Categories 2 and 3 is .58 in the Colombian sample and .98 in the Spanish sample (much lower than the interval of ≥1.40 and ≤ 5, corresponding to the criteria proposed by the Rasch model for items with polytomy). This leads us to suggest that the fusion of these two categories improves the index score.
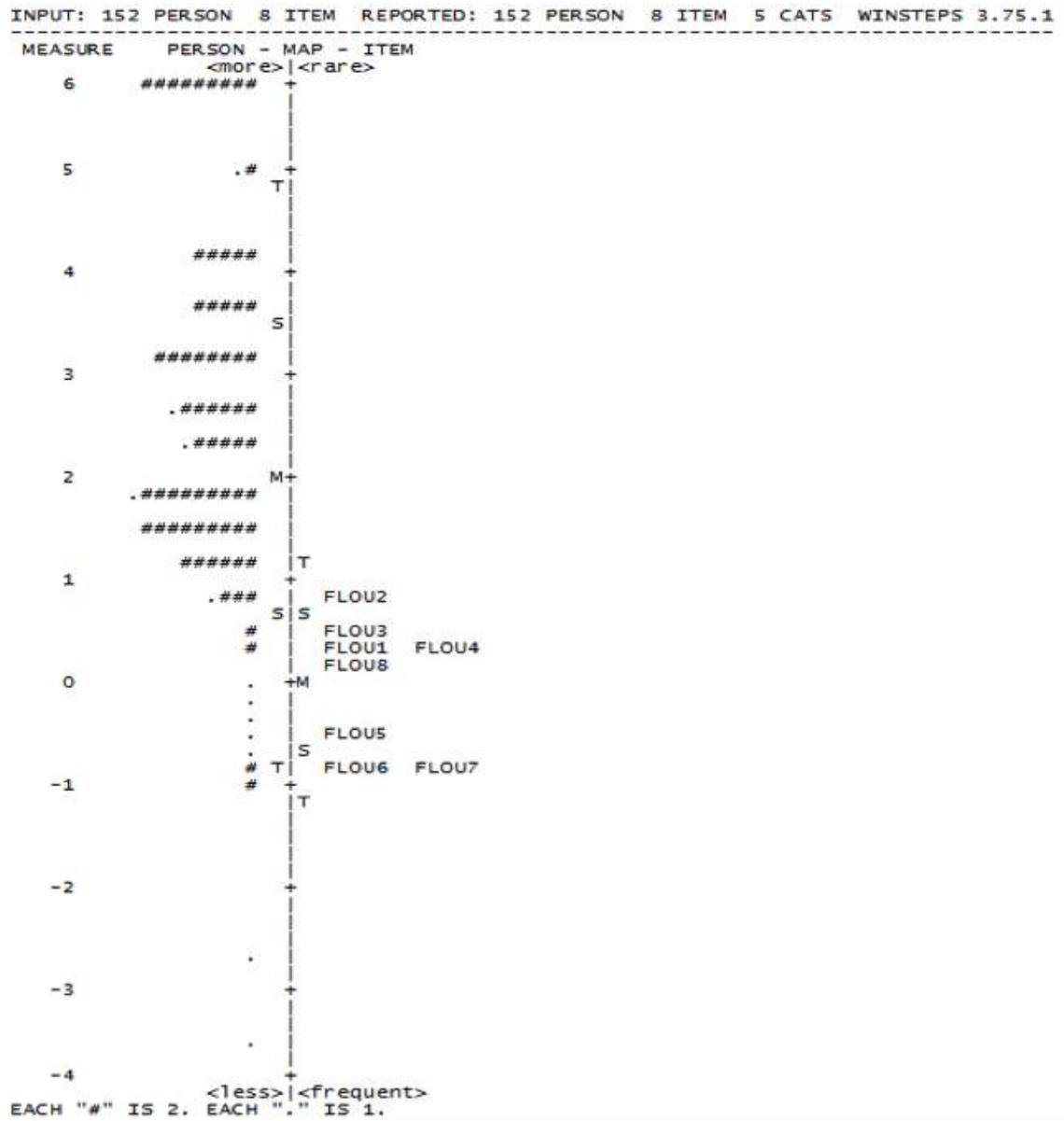
```
INPUT: 152 PERSON   8 ITEM   REPORTED: 152 PERSON   8 ITEM   5 CATS   WINSTEPS 3.75.1
---------------------------------------------------------------------------------------
  MEASURE      PERSON - MAP - ITEM
                   <more>|<rare>
      6       ########  +
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      5            .#   +
                      T |
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                 ####   |
      4                 +
                 ####   |
                      S |
              #######   |
      3                 +
               .#####   |
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      2                M+
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      1                 +
             .###     | | FLOU2
                   S | S
                 #   |    FLOU3
                 #   |    FLOU1   FLOU4
                     |    FLOU8
      0          .   +M
                 .   |
                 .   |    FLOU5
                 .   |S
                 #  T|    FLOU6   FLOU7
     -1          #   +
                     |T
                     |
                     |
                     |
     -2              +
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                     |
                 .   |
     -3              +
                     |
                     |
                 .   |
     -4              +
                  <less>|<frequent>
  EACH "#" IS 2. EACH "." IS 1.
```

Figure 1. **Wright map (items of Colombian students).**

```
INPUT: 207 PERSON  8 ITEM  REPORTED: 207 PERSON  8 ITEM  5 CATS  WINSTEPS 3.75.1
--------------------------------------------------------------------------------

MEASURE      PERSON - MAP - ITEM
                  <more>|<rare>
     6          .####  +
                       |
                       |
                       |
                ####   |
     5                 +
                     T |
                       |
               .###### |
     4                 +
                .####  |
               .###### S|
     3                 +
              .####### |
              ####### |
                       |
     2         ####### +
                     M |
            .######### |
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     1        .####### +T FLOU7
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              ###### |S
                 ## S|  FLOU1
                     |  FLOU3    FLOU8
     0           ### +M
                   # |  FLOU4
                 ### |  FLOU2
                     |S
                  .  |  FLOU5    FLOU6
                  .  |
    -1            .  +T
                 .#  T|
                  .  |
                  .  |
    -2                +
                 <less>|<frequent>
EACH "#" IS 2. EACH "." IS 1.
```
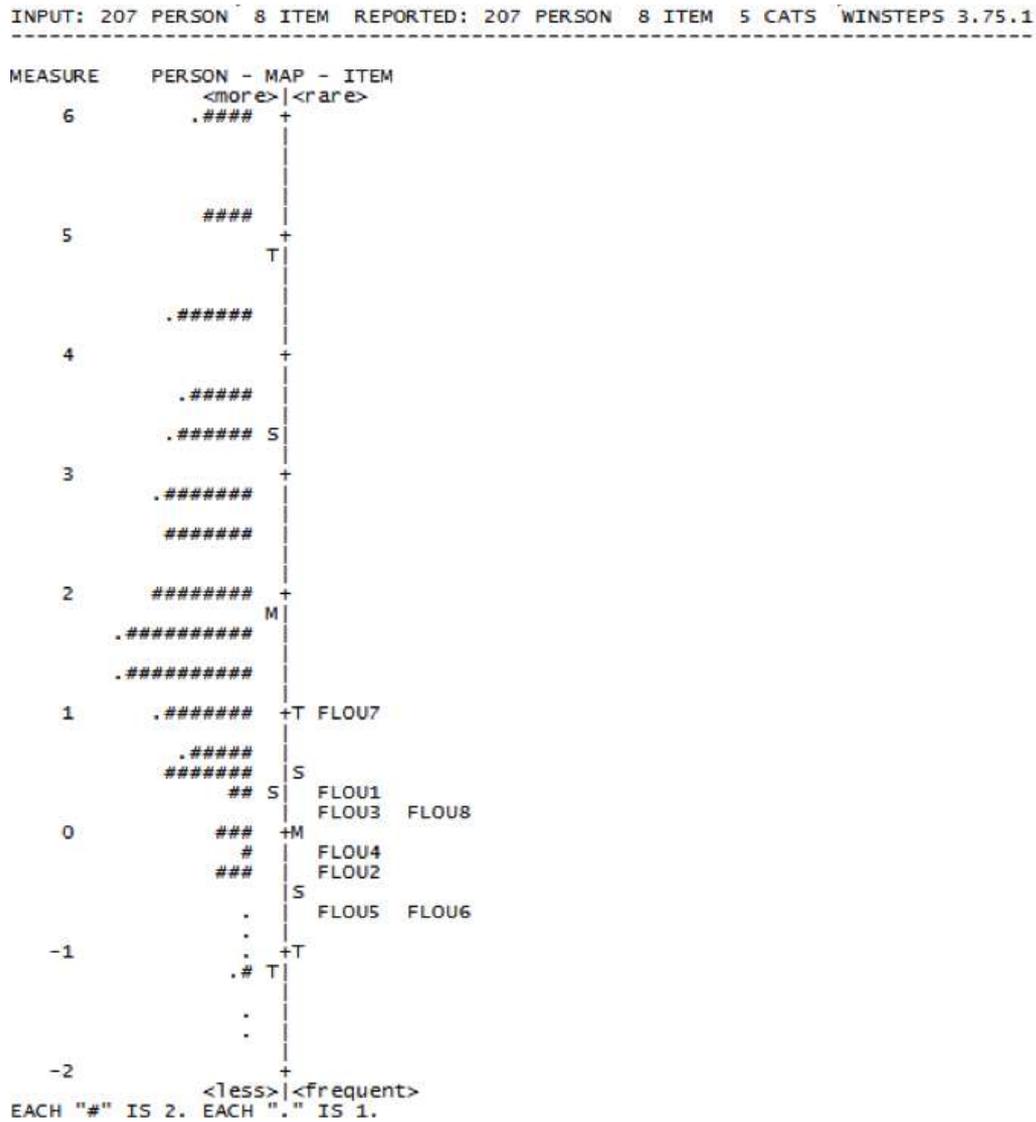
***Figure 2.* Wright map (items of Spanish students).**

Factor structure of the FS

The distribution of the data in the two samples was non-normal. However, the values of skewness (Colombia = -0.81 and Spain = -0.63) and kurtosis (Colombia = 1.31 and Spain = 0.53) did not exceed 2 and 7, respectively, which, according to Finney and DiStefano (2006), could have an impact on the results of the analyses with structural equations (for estimations by maximum likelihood). In the Colombian sample, the model obtained good fit indices (CFI = 0.92, GFI = 0.92, NFI = 0.87), although the parsimony fit was not very good (CMIN/df = 2.29 and RMSEA = 0.09). An important covariance was observed between items 2 and 6 and the fit indices improved upon including this covariance in the model (CFI = 0.97, GFI = 0.95, NFI = 0.92, CMIN/df = 1.42, and RMSEA = 0.05).

In the Spanish sample, the results were similar for the fit indices (CFI = 0.95, GFI = 0.94, NFI = 0.91) and the parsimony indices (CMIN/*df* = 2.36 and RMSEA = 0.08). An important covariance was observed between items 1 and 3 and when this covariance was included in the model and the indices recalculated, an improvement in the fit of the model was obtained (CFI = 0.97, GFI = 0.96, NFI = 0.94, CMIN/*df* = 1.77, and RMSEA = 0.06).

We analyzed the invariance factor in the two samples simultaneously. Table 5 shows the indices obtained for each model, beginning with fewer parameter constraints (configural invariance) and ending with a more constrained model (strict invariance). In Model A (configural invariance), due to the chi square value, we discarded the hypothesis of invariance; however, considering that the remaining indices (RMSEA, CFI, and TLI) indicate the opposite and also being aware that chi square is susceptible to the effect of sample value, we decided to accept the invariance model. Upon analyzing Model B (metric invariance), the same result was observed in the contrast between the value of chi-square and the RMSEA, CFI, and TLI indices. When calculating the difference between the CFI of Model B and Model A, we obtained a value of -.001, and the respective difference for the TLI indices yielded a value of .01. The values obtained again support the proposed hypothesis. When testing Model C, we observed an increase in the RMSEA value, as well as a decrease in the CFI and TLI indices, although the difference for CFI was -.09, and for TFL, -.08. After assessing the available information, we decided not to accept the model of strong invariance. We present the values obtained for Model D, although we expected to reject it in view of the results of Model C, which had fewer constraints. A slight increase was observed in RMSEA, as well as a decrease in CFI and TLI.

Table 5. **Multi-group Analysis of the FS**

Model	χ^2	*p*	RMSEA	CFI	TLI
Configural invariance	93.129	.000	.062	.940	.916
Metric invariance	100.858	.000	.057	.939	.927
Strong invariance	196.332	.000	.085	.841	.841
Strict invariance	232.445	.000	.087	.809	.833

Note: RMSEA = Root Mean Square Error of Approximation, CFI = Comparative Fit index and TLI = Tucker-Lewis index.

Discussion

The purpose of the present study consisted of analyzing the FS psychometric properties and the factor structure of the FS in its Spanish version (Melipillán et al., manuscript not published), in an attempt to validate the scale in Spanish and to adapt it to two samples of university students from Spain and Colombia.

The results of the CFA support the single factor structure of the scale as well as its metric invariance across diverse samples, which allow us to confirm the hypotheses. CFA yielded a single factor explaining a more than reasonable percentage of variance. Another significant finding is that the instrument has a broad potential of utility and development due to the good reliability obtained by means of the Cronbach's alpha. These good results are complemented with the findings concerning the reliability and validity of the items according to the Rasch model.

For future studies, the Rasch analyses of the FS shows that it would be necessary to incorporate some more difficult items for those individuals with higher levels of flow. This same analysis suggests the possibility of reducing the response categories from 5 to 4, because categories 2 and 3 overlap. This reduction would increase the parsimony and functionality of the scale. These results occurred both in the Colombian and the Spanish samples. The use of the Rasch model guarantees acceptable measurement reliability and so, it is possible to define clearly the target construct of the study. The analyses conducted indicate that the FS adapted to the Spanish and Colombian contexts has highly satisfactory psychometric properties, with a single and invariant factor structure, very adequate internal consistency and important item reliability, which make it a reliable scale.

In regard to the concept of Flow, Seligman (2011) defines it as a construct inherent to the well-being theory, from which it is considered that five elements exist that favor it: positive emotion, dedication, relationships, meaning and achievements. In the educational environment, this author defends the importance of the development of the student's academic abilities, together with the use of approaches that promote their well-being and mental health.

Hence, it is been demonstrated that practice in *Flourishing* has positive consequences on the development of self-control abilities and the time spent completing a program of studies studies program (Howell, 2009). Likewise, it has been associated with positive emotion perception, which facilitates and promotes a broader and more creative thought (Fredrickson, 2001; Fredrickson & Branigan, 2005).

Lastly, it can be considered that students having this ability are happy, prosper in their social relations, attain their goals with confidence and competence, and make valuable contributions to everyone else (Norrish, Williams, O´Connor & Robinson, 2013). Thus, *Flourishing* has been linked with the expression of social and moral conscience among the students (Wilson-Strydom & Walker, 2015).

These relations have been widely demonstrated in previous research, where besides confirming the validity and reliability of the flourishing scale in different countries and languages, a positive significant relationship between flourishing scale and academic achievement and other psychological well-being and feelings scales has been shown (Ghasemi & Ghamarani, 2015; Hone, Jarden & Schofield, 2013;Silva & Caetano, 2013; Sumi, 2014; Tang, Duan, Wang & Liu, 2014). In conclusion, an individual's well-being is a desirable aspect of the development of society. This characteristic is associated with creativity, generosity, good health, and increased life expectancy (Tang, Duan, Wang & Liu, 2014).

Given the psychometric properties of FS, the present research instrument could be used in positive psychology studies in Spanish-speaking population in relation to academic outcomes but also to assess the role of flourishing in the well-being and mental health of students. This could be useful in the future development of university education programs and policies in order to promote the integral improvement of college students from a broader perspective.

The present study, however, has some *limitations.* Among those are that it has been developed with a non-representative sample of both countries constraining it two just two cities. Additionally, the sample was also limited in regard to the academic programs and years. It would be desirable for future research to widen and diversify the sample, including other Spanish-speaking countries. Likewise, it is recommended to establish some evidence of convergent and discriminant validity with other measures of well-being and mental health. In that sense, future studies could incorporate models that establish the interaction among various factors and the predictive capability of FS over the academic performance and other important aspects of the student's well-being.

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