

Psychometric Properties of a European Spanish Version of the Perceived Stress Scale (PSS)

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This paper presents evidence from a heterogeneous sample of 440 Spanish adults, for the reliability and validity of a European Spanish version of the Perceived Stress Scale (PSS), designed to measure the degree to which situations in one's life are appraised as stressful. The European Spanish version PSS (14-item) demonstrated adequate reliability (internal consistency, $\alpha = .81$, and test-retest, $r = .73$), validity (concurrent), and sensitivity. Additional data indicate adequate reliability ($\alpha = .82$, test-retest, $r = .77$), validity, and sensitivity of a 10-item short version of the PSS.

Keywords: PSS, psychometric properties, Spanish, Spain, perceived stress

El presente artículo demuestra la fiabilidad y la validez de la versión española de la Escala de Estrés Percibido (PSS en el original) a partir del estudio de las propiedades psicométricas de la escala en una muestra heterogénea de 440 adultos españoles. La PSS fue diseñada para medir el grado en que las situaciones en la vida se valoran como estresantes. La versión española de la PSS (14-ítems) demostró una adecuada fiabilidad (consistencia interna, $\alpha = .81$, y test-retest, $r = .73$), validez (concurrente), y sensibilidad. Datos adicionales indicaron una fiabilidad ($\alpha = .82$, test-retest, $r = .77$), validez, y sensibilidad adecuadas también para la versión corta de 10-ítems (PSS-10).

Palabras clave: PSS, propiedades psicométricas, Español, España, estrés percibido

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The Perceived Stress Scale (PSS), developed by Cohen, Kamarck, and Mermelstein (1983), is being used with an increasing degree of regularity in a variety of samples. Studies utilizing the PSS as a measure of perceived stress include, for example, those addressing susceptibility to respiratory diseases (Cobb & Steptoe, 1996; Cohen, Doyle, & Skoner, 1999; Cohen, Tyrell & Smith, 1993); wound healing (Glaser et al., 1999); prostate cancer (Stone, Mezzacappa, Donatone, & Gonder, 1999); stress of caretakers of chronic (Alzheimer's) patients (Dyck, Short, & Vitaliano, 1999; Losada-Baltar, 2005; Stowell, Kiecolt-Glaser, & Glaser, 2001); academic stress (Malarkey, Pearl, Demers, Kiecolt-Glaser, & Glaser, 1995); stress related to HIV infection/AIDS (Crues et al., 1999; Ironson et al., 2002; Remor, 2000; Remor & Carrobbles, 2001); and stress related to psychiatric patients (Hewitt, Flett, & Mosher (1992).

The PSS was designed to measure "the degree to which individuals appraise situations in their lives as stressful" (Cohen, 1986, p. 716). Items evaluate the degree to which people find that life is unpredictable, uncontrollable, or overloaded. These three aspects have repeatedly been confirmed as central components of the experience of stress (e.g., Averill, 1973; Cohen, 1978; Glass & Singer, 1972; Lazarus, 1966; Seligman, 1975). The scale includes questions intended to evaluate the current level of stress experienced by the subject. The PSS is a brief scale, consisting of only 14 items (a shorter version with 10-items, the PSS-10, is also available), administered in only a few minutes, and easily scored. Moreover, because the PSS taps general beliefs about perceived stress without providing subjects with a list of specific life events, scores are not biased by event content or by differential recall of past life experiences.

Because the level of perceived stress seems to be influenced by daily stressors, vital events, and resources encountered by the subject, the temporal validity of stress evaluated by the PSS is brief: 8 weeks (Cohen et al., 1983).

Although previous studies in the U.S. and Canada (e.g., Cohen et al., 1983; Cohen, Kessler, & Gordon, 1995; Hewitt et al., 1992) suggest that the psychometric properties of the scale for evaluating perceived stress are adequate, it is necessary to study the psychometric properties in a Spanish sample. In previous work published in Spain (Remor &

Carrobbles, 2001), preliminary results including psychometric data suggested good performance of the scale in assessing perceived stress. The objective of the present study was to ascertain the psychometric properties of the PSS in a larger, more diverse Spanish sample both of healthy and ill adults. In particular, we attempted to verify its reliability (related to internal consistency and test-retest), and, secondly, to verify its validity with reference to an external criterion (concurrent validity), as well as validity related to sensitivity. A third objective was to test the utility of the PSS short version (10 items) in assessing perceived stress.

Method

Participants

A total of 440 participants were assessed during this validation study: 195 males and 240 females (and 5 participants of unspecified sex). The mean age of the sample was 31.7 years ($SD = 9.9$; range 18-69 years). This sample was composed of four different groups of participants: (a) parents of chronically-ill children (hemophilia), (b) substance abusers undergoing outpatient methadone treatment at the Drug-Addict Attendance Center, (c) generally healthy undergraduate university students¹, and (d) HIV-positive individuals (with 5+ years of HIV infection) undergoing outpatient treatment at the university hospital. Table 1 details the sample characteristics.

Instruments

Perceived Stress Scale (PSS; Cohen et al., 1983). The level of perceived stress was evaluated by means of the PSS Scale. This scale is a self-report instrument that evaluates the level of perceived stress during the last month, and consists of 14 items with a 5-point response scale (0 = *never*, 1 = *almost never*, 2 = *once in a while*, 3 = *often*, 4 = *very often*). The total score of the PSS is obtained by reversing the scores of items 4, 5, 6, 7, 9, 10, and 13 (in the following manner: 0 = 4, 1 = 3, 2 = 2, 3 = 1, and 4 = 0) and subsequently adding the 14 item scores. A higher score indicates a higher level of

Table 1
Sample Characteristics ($N = 440$)

	HIV-positive outpatients (>5 years HIV+) ($n = 100$)	Substance abusers in outpatient methadone treatment ($n = 51$)	Parents of chronically ill children (hemophilia) ($n = 60$)	University students ($n = 229$)
Mean Age (SD)	37.3 (8.3)	34.9 (5.1)	37.4 (6.4)	26.9 (9.9)
Sex (%)				
Men	59	83.3	40	46.3
Women	41	16.7	60	53.7

¹ The assessment sessions of the university student group were performed during the month prior to the university exams period.

perceived stress. Scale items are easy to understand and the response alternatives are easy to mark.

Following the guidelines from the original authors of the scale (Cohen et al., 1983), a short 10-item version can be created from the PSS pool of items: the *PSS-10*. PSS-10 scores are obtained by reversing the scores on the four positive items (Items 6, 7, 8, and 9) and then summing across all 10 items (1, 2, 3, 6, 7, 8, 9, 10, 11, and 14). A European Spanish version of the PSS scale is presented in Appendix A.

Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The HADS is composed of 14 items divided into two subscales with 7 items each, evaluating Anxiety (HADS-A) and Depression (HADS-D), respectively. A Global Distress measure (HADS-T) can be obtained by summing across all 14 items (Bjelland, Dahl, Haug, & Neckelmann, 2002). The scale is a self-administered instrument with a 4-point Likert-type scale (0 to 3). The anxiety level of our clinical-sample subjects was evaluated by means of the HADS-A, and the distress level by means of the total HADS-T scores. The Spanish version of the HADS has shown adequate psychometric properties in Spanish populations (e.g., Ibáñez, 1992; López-Roig et al., 2000; and Terol, Rodríguez-Marín, López-Roig, Martín-Aragón, & Pastor, 1997). The alpha coefficient for the HADS-T in the current sample was .86, and .83 for the HADS-A subscale.

Procedure

The 14-item Perceived Stress Scale was translated from English into European Spanish by a native English-speaking bilingual translator. Subsequently, this translation was revised independently by two bilingual psychologists (both native European Spanish-speaking). In the third step, they agreed on a final common translation. This common version was back-translated (Spanish to English) by a different person to ensure the equivalence and accuracy of the translation. Before starting the psychometric study, the questionnaire was administered to a few adults to assess its comprehensibility and acceptance; minor changes resulted. Finally, the revised version was administered to the 440-adult sample in order to assess its psychometric properties.

For all participants who chose to enroll in the study, informed consent was obtained, and their responses were confidential and anonymous. Each subject was interviewed individually by trained psychologists, except for the university students, who were evaluated in a group session. Regarding the PSS protocol, all participants filled in the questionnaire in its 14-item form. For the specific analysis addressing data related to the PSS-10, items were selected from the complete questionnaire version to avoid overlap of items (i.e., the PSS-10 was not applied separately). A similar procedure was employed by the original authors of the scale (see Cohen & Williamson, 1988). A test-retest session with an intervening 2-week interval was conducted with the university students.

Statistical Analyses

Descriptive statistics (mean, standard deviation, and range) were calculated with all variables; percentage of sex category was also described. The reliability related to internal consistency was measured by alpha coefficient and test-retest by Pearson's correlations. Concurrent validity was assessed by Pearson's correlation between PSS scores and HADS (clinical sample). Sensitivity of the scale was assessed by: (a) addressing sex effects in perceived stress (an ANOVA was conducted using the total PSS scores as the dependent variable and sex as the independent variable); (b) addressing age effects in perceived stress (a Pearson correlation was conducted); and (c) addressing the ability of the scale to identify different populations under different degrees of stress (an ANCOVA between sample groups was performed: Sex \times Group with age as covariable); in addition, a post hoc analysis was conducted as well, to identify between which groups the differences were significant. All data analyses were performed using SPSS/PC, version 11.0.

Results

Descriptive Results

The mean score on the PSS for the complete sample (males and females combined) was 25.0 ($SD = 8.1$; range 3-45), and the mean score for the PSS short version (PSS-10) was 17.6 ($SD = 6.7$; range 1-34).

Reliability (Internal Consistency and Test-Retest Reliability)

For the complete sample, the reliability related to internal consistency (alpha coefficient) for the PSS and short version PSS-10 was .81 and .82, respectively. To address test-retest reliability, the PSS was administered, on two occasions separated by a 2-week interval, to 63 undergraduate college students. The test-retest correlation in this sample was .73 ($p = .000$) for the PSS, and .77 ($p = .000$) for the PSS-10.

Concurrent Validity

To address concurrent validity, indicated by the correlation between PSS (and PSS-10) scores and other instruments that measure similar constructs, the HADS-T (distress) and HADS-A (anxiety) scores were employed. Results of the Pearson correlations are presented in Table 2. As expected, both measures were correlated. A higher correlation was found with distress level in comparison with anxiety level.

Sensitivity of the Scale to Sex and Age Effects

Previous literature supports the hypothesis that stress measures can be expected to show sex and age differences

Table 2
Concurrent Validity of the Perceived Stress Scale

	HADS-T (distress) (<i>n</i> = 147)	HADS-A (anxiety) (<i>n</i> = 147)
PSS (14-items)	.71**	.64**
PSS-10	.72**	.66**

** *p* < .001 for all correlations

(e.g., Brody & Hall, 1993; Cohen & Williamson, 1988; Hewitt et al., 1992; Hovanitz & Kozora, 1989).

To address possible sex effects in perceived stress, an ANOVA was conducted using total PSS (and PSS-10) scores as the dependent variable and sex as the independent variable. Women had higher scores in perceived stress than did men; this result was statistically significant both for the PSS and the PSS-10. Table 3 shows the descriptive and ANOVA results concerning sex. In addition, a Pearson correlation was conducted between PSS and age to assess a possible age effect. The result was significant for both versions: PSS, $r = -.18$, $p = .000$; and PSS-10, $r = -.18$, $p = .000$.

Sensitivity of the Scale to Detect Populations under Different Levels of Stress

For the sensitivity analysis, we hypothesized that groups under higher levels of stress would score higher in the PSS (and PSS-10). Following this hypothesis, we predicted that the group scoring highest would be the parents of chronically ill children, and the group scoring lowest would be the HIV+ outpatients 5+ years post-diagnosis. Scoring at intermediate levels would be the groups of substance abusers in outpatient methadone treatment and the university students facing the exam period.

The rationale for placing the groups in that order results from a literature review. Regarding the group classified as higher stress (parents of chronically ill children), Streisand, Braniecki, Tercyak, and Kazak (2001) found that raising a child with a physical

disability or illness is a distressful situation for parents, often due to their lack of control over the course of the child's disease. The group classified as lower stress in comparison with the other groups was the HIV+ outpatients 5+ years post-diagnosis. In wealthy countries with government-subsidized medical care, the experience of living with HIV in the modern antiretroviral-therapy era is significantly less stressful than in the past, due to extended survival and enhanced quality-of-life offered by the new pharmacological treatments (Siegel & Lekas, 2002). In addition, research suggests that, whereas an HIV diagnosis increases psychological distress, after 6 to 8 weeks, individuals tend to return to their psychological status prior to diagnosis (Perry et al., 1990). The group classified as having intermediate levels of stress was that of the substance abusers in outpatient methadone treatment. According to the literature, methadone treatment helps individuals undergoing drug detoxification cope with withdrawal symptoms and emotional distress (e.g., Amato, Davoli, Ferri, Gowing, & Perucci, 2004). With respect to the university students facing the exam period, recent studies show that stress levels vary temporally: as the exam period draws near, the stress experience heightens (e.g., Guarino, Gavidia, Antor, & Caballero, 2000; Malarkey et al., 1995).

As the groups are not equivalent in age and sex, which could affect the sensitivity of the test to differentiate between the groups, we propose to analyze it by means of a 2-factor ANCOVA: Sex \times Group with age as a covariable.

PSS. To assess the sensitivity of PSS scores to distinguish between various subject populations under different degrees of stress, an ANCOVA was performed, designating PSS scores as a dependent variable and subject grouping as an independent variable, adjusting for sex by group with age as covariable.

The ANCOVA main effects, $R^2 = .086$, $F(7, 410) = 5.380$, $p = .000$, regarding the groups defined by the variable stress group level² revealed that the average stress of the groups was significantly different ($p = .000$). The average stress of the groups defined by the variable sex did not differ ($p = .054$). No intersection effects were found, $F(3, 410) = 0.754$, $p =$

Table 3
Descriptive Results for PSS Scores with Respect to Sex

	Mean (<i>SD</i>)	Coefficient intervals for the mean (95%)		ANOVA
		Low Limit	High Limit	
PSS (14-item) ^a				$F(1, 408) = 13.9$, $p = .000$
Men	23.6 (7.8)	22.1	24.3	
Women	26.6 (8.1)	25.4	27.5	
Short version				
PSS-10 ^b				$F(1, 409) = 13.9$, $p = .000$
Men	16.4 (6.4)	15.1	16.9	
Women	18.9 (6.7)	18.0	19.7	

Note: ^a Levene (1, 408) = 0.591, $p = 0.442$; ^b Levene (1, 409) = 1.393, $p = 0.239$.

² Stress group levels: HIV-positive outpatients (5+ years HIV+); Substance abusers in outpatient methadone treatment; Parents of chronically ill children (hemophilia); and University students one month before exams period.

0.520. With this data, we can state that the differences in the stress levels of the different groups (e.g., parents of chronically ill children, HIV+ outpatients, substance abusers, or students) are the same considering men and women; that is, if they were in the same group, men and women scored the same.

The covariable age, $F(1, 403) = 11.791, p = .001$, was linearly related to the dependent variable stress, $R^2 = .111, F(8, 403) = 6.158, p = .000$. However, it can be verified that, after controlling the effect of this covariable (age), the three effects present in the model (group, sex, and the Group \times Sex interaction) maintain the same significance that they already had in the ANOVA before controlling the effect of the covariable. Therefore, the effect of group continues being significant and the effects of sex and the Group \times Sex interaction is still nonsignificant. It could be said that the relation with the covariable (age) does not alter the relation between the independent variable (group) and the dependent variable (stress).

PSS Short Version. The ANCOVA main effects, $R^2 = .077, F(7, 411) = 4.829, p = .000$, regarding the groups defined by the variable stress group level revealed that the average stress of the groups was significantly different ($p = .006$), and that the average stress of the groups defined by the variable sex was also significantly different ($p = .042$). However, no intersection effects were found, $F(3, 411) = 0.988, p = .398$. In view of this data, we could affirm that the differences observed in the level of stress in the different groups are similar for men and women.

The covariable age, $F(1, 404) = 9.305, p = .002$, was linearly related to the dependent variable stress, $R^2 = .096, F(8, 404) = 5.257, p = .000$. However, it can be verified that, after controlling the effect of this covariable (age), the three present effects in the model (group, sex, and the Group \times Sex interaction) maintain the same significance that they already had in the ANOVA before controlling the effect of the covariable.

Therefore, the effect of group continues to be significant and the effects of sex and the Group \times Sex interaction remain nonsignificant. It could be said that the relation with the covariable (age) does not alter the relation between the independent variable (group) and the dependent variable (stress).

Post hoc comparisons. Following the performance of the ANCOVAs, additional post hoc analyses were conducted with the whole sample to identify differences between groups. Results are shown in Table 4. As can be seen, the differences between the extreme hypothesized groups were clearly significant (e.g., A > C, A > D).

Utility of PSS Short Version: PSS-10

The above data confirm the utility of the PSS short version in assessing perceived stress in circumstances where it is impractical to administer the complete Perceived Stress Scale.

The correlation between the PSS-10 (Time 1) and the PSS (Time 2) after a 2-week interval was $r = .76, p = .000$. In addition, the PSS-10 total score was able to predict 59% of the variance of the PSS total scores after a 2-week interval, $R^2 = .590, F(1, 62) = 89.31, p = .000$. These data suggest that the 10-item version provides a reliable and valid measure of perceived stress for use in follow-up interviews and other situations where a short scale is required.

Discussion

The purpose of the present study was to examine the psychometric properties (reliability and validity) of the European Spanish version of the Perceived Stress Scale and its short version (PSS-10). The results show that the European Spanish version of the PSS (including the PSS-

Table 4
ANCOVA post hoc Analysis

Instrument	Total sample (Post hoc Analysis Games-Howell)			
	Group (I)	Group (J)	Mean differences (I-J)	<i>p</i>
PSS Levene (7, 402) = 2.65, <i>p</i> = .011	A	B	2.8	.204
	A	C	3.5	.004*
	A	D	6.0	.000**
	B	C	0.6	.959
	B	D	3.1	.142
	C	D	2.5	.071†
PSS-10 (short version) Levene (7, 403) = 3.01, <i>p</i> = .004	A	B	1.2	.736
	A	C	2.1	.038*
	A	D	4.0	.000**
	B	C	0.9	.809
	B	D	2.8	.103
	C	D	1.8	.137

Note. A = Parents of chronically ill children (hemophilia); B = Substance abusers in outpatient methadone treatment; C = University students one month before exams period; D = HIV-positive outpatients (5+ years HIV+).

† almost significant ($p < .10$). * $p < .05$. ** $p < .001$.

10) has adequate reliability (for both internal consistency and test-retest), as well as adequate validity (concurrent) and sensitivity (variations in stress levels for subgroups of population). Moreover, the performance of the assessment with the participant groups in this study confirms that the European Spanish version of the questionnaire is easy to understand and quick to administer, supporting its practicality for use in everyday clinical and research practice.

Regarding the possible influence of sex effects on perceived stress, our findings are consistent with earlier findings of Cohen and Williamson (1988) and Hewitt et al. (1992), who also found sex differences in perceived stress measured by the PSS. In our sample, women received significantly higher perceived stress scores than did men both on the total PSS and the PSS-10. The reasons for this finding may be related to sex differences in coping with stress as described by Hovanitz and Kozora (1989). As Brody and Hall (1993) suggested, studies using self-report measures of emotional experience have yielded fairly consistent sex differences in internally focused negative emotions. Future research should continue to address and examine this issue. Whereas, in our sample, age was significantly inversely correlated with the perceived stress level ($-.18$), suggesting that perceptions of stress tend to decline as age increases, that result must be interpreted with care, as the correlation was very low (a result consistent with previous work by Cohen and Williamson, 1988). These apparent effects could decrease or disappear entirely if we controlled for education or income (data not available for the present study). This limitation should be taken into account in future studies.

An additional limitation of this study concerns the data provided regarding the usefulness of the PSS short version (PSS-10), as the short version was not applied in separate form (rather, the 10 items were selected from the pool of 14 items which make up the complete scale). Future work using the PSS-10 may be warranted in order to provide more psychometric information (e.g., reliability) and replicate the results of this study.

As an indicator of concurrent validity, adequate correlations with distress (HADS-T) and anxiety (HADS-A) levels were observed, as expected. Furthermore, different PSS scores were obtained from individuals from different group populations dealing with different levels and types of life stressors, revealing sensitivity. Indeed, all groups scored differently from one another (and as was hypothesized), suggesting different degrees of stress experience, although not all differences were statistically significant. Perhaps the fact that all groups were coping with adversity (e.g., caring for a child with a chronic illness, receiving drug detoxification treatment, facing the university exams period, or living with a disease) caused group stress scores to range similarly. Future research should compare “no-stress” or low-stress versus distressed groups, in order to confirm sensitivity of the scale. However, as the original authors of the scale stated (Cohen & Williamson, 1988), the PSS is not a diagnostic instrument,

so there are no cut-offs for the classification for “high,” “medium,” or “low” stress. There are only comparisons between the people in the researcher’s own sample.

Other psychometric properties of the PSS and PSS-10, such as internal consistency (.81 and .82, respectively) and test-retest reliability with a 2-week interval (.73 and .77, respectively) were also satisfactory.

If readers are asking, “Which scale version is the best?,” as the psychometric properties of both versions (PSS and PSS-10) are similar, the answer could be the following: With the data reported in this paper, we were able to conclude that the PSS-10 provides as adequate measure of perceived stress as the longer scale. Moreover, the PSS-10 had somewhat higher internal reliability and test-retest reliability than the PSS complete version (14 items), and correlations between the PSS-10 and concurrent measures were equivalent to those found with the PSS. Sensitivity was similar for both versions, as well.

Therefore, and because shorter versions make studies with multiple measures feasible, we might recommend the use of the PSS-10 for future research. A similar argument was discussed by Cohen and Williamson (1988), reviewing data addressing PSS psychometric properties from a probability sample of the United States. In addition, for international research comparison purposes, the use of the PSS-10 has increased in the last decade in several countries.

Lastly, the data reported in this article are from heterogeneous, diverse samples, including both healthy and ill adults, of varying socioeconomic status, as is more typical of the general population. In light of the generality of scale content and simplicity of language and response alternatives, we conjecture that data from future representative samples of the general population would not differ significantly from those reported above.

In summary, the European Spanish version of the PSS seems to be an accurate instrument to assess perceived stress both in clinical and research settings.

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Appendix

European Spanish version of the Perceived Stress Scale

Las preguntas en esta escala hacen referencia a sus sentimientos y pensamientos durante el **último mes**. En cada caso, por favor indique con una "X" cómo usted se ha sentido o ha pensado en cada situación

Ítems PSS	Ítems PSS10		Nunca	Casi nunca	De vez en cuando	A menudo	Muy a menudo
PSS	PSS10	En el último mes, ¿con qué frecuencia ha estado afectado por algo que ha ocurrido inesperadamente?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia se ha sentido incapaz de controlar las cosas importantes en su vida?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia se ha sentido nervioso o estresado?	0	1	2	3	4
PSS		En el último mes, ¿con qué frecuencia ha manejado con éxito los pequeños problemas irritantes de la vida?	0	1	2	3	4
PSS		En el último mes, ¿con qué frecuencia ha sentido que ha afrontado efectivamente los cambios importantes que han estado ocurriendo en su vida?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia ha estado seguro sobre su capacidad para manejar sus problemas personales?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia ha sentido que las cosas le van bien?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia ha sentido que no podía afrontar todas las cosas que tenía que hacer?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia ha podido controlar las dificultades de su vida?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia se ha sentido al control de todo?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia ha estado enfadado porque las cosas que le han ocurrido estaban fuera de su control?	0	1	2	3	4
PSS		En el último mes, ¿con qué frecuencia ha pensado sobre las cosas que le quedan por lograr?	0	1	2	3	4
PSS		En el último mes, ¿con qué frecuencia ha podido controlar la forma de pasar el tiempo?	0	1	2	3	4
PSS	PSS10	En el último mes, ¿con qué frecuencia ha sentido que las dificultades se acumulan tanto que no puede superarlas?	0	1	2	3	4