

## Basic psychological need satisfaction and frustration in Mexican teachers: psychometric properties, structure and factor invariance

### Satisfacción y frustración de necesidades psicológicas básicas en docentes mexicanos: propiedades psicométricas, estructura e invarianza factorial

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#### Abstract

The aim of this study was to examine the psychometric properties, structure, and factorial invariance regarding gender of the Basic Psychological Need Satisfaction and Frustration Scale adapted to the educational work context. A total of 568 teachers from 74 schools (63% women, 37% men) between 18 and 63 years of age ( $M_{age} = 37.37$ ;  $SD = 10.37$ ) participated. The results revealed adequate goodness-of-fit indexes for the proposed models (two and six factors); the six-factor model presented a better fit to the data. The reliability of the different subscales was adequate and presented evidence of strict factorial invariance with regard to the gender groups. In conclusion, the Basic Psychological Need Satisfaction and Frustration Scale is a reliable and valid instrument, based on the theory of self-determination that can be used to measure the degree of satisfaction and frustration of autonomy, competence, and relatedness in the educational work context of Mexico.

**Keywords:** Self-Determination Theory; Autonomy; Competence; Relatedness; Teachers; Mexico

#### Resumen

El objetivo del estudio fue examinar las propiedades psicométricas, estructura e invarianza factorial respecto al sexo de la *Basic Psychological Need Satisfaction* y *Frustration Scale* adaptada al contexto laboral educativo en México. Participaron 568 profesores de 74 planteles educativos (63% mujeres, 37% hombres) con edades comprendidas entre 18 y 63 años ( $M_{edad} = 37.37$ ;  $DT = 10.37$ ). Los resultados revelaron índices de bondad de ajuste adecuados para los modelos propuestos (dos y seis factores), de los cuales, el modelo de seis factores presentó mejor ajuste a los datos. Las fiabilidades de las diferentes subescalas fueron adecuadas y se presenta evidencia de invarianza factorial estricta respecto a los grupos de sexo. En conclusión, la escala satisfacción y frustración de las necesidades psicológicas básicas es un instrumento fiable y válido, basado en la teoría de la autodeterminación que puede ser utilizado para medir el grado de satisfacción y frustración de autonomía, competencia y relaciones en el contexto laboral educativo de México.

**Palabras clave:** Teoría de la Autodeterminación; Autonomía; Competencia; Relaciones; Docentes; México.

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## Introduction

Self-Determination Theory (SDT; Deci & Ryan 1985, 2002; Ryan & Deci, 2017) has been used to explore the beliefs that humans have regarding the environment and to guide research regarding experiences of students and that of employees in business environments (De Meyer et al., 2014; Gagné et al., 2008). A central idea of SDT is that individual performance is influenced by the extent to which the work context is perceived to support autonomy; for example, when a person of authority supports and respects the interests of people and promotes choice (Deci & Ryan, 2008).

According to Basic Psychological Needs Theory (BPNT; Deci & Ryan, 2002; Ryan & Deci, 2017), one of the six mini-theories that comprise SDT, individuals have an innate tendency towards vitality and effective function in the measure to which his or her basic psychological needs of autonomy, competence, and relatedness are satisfied (Deci & Ryan, 2008).

Autonomy satisfies a basic need of employees regarding the freedom to carry out their work allowing them to reach their work objectives (Nahrgang et al., 2011). Likewise, autonomy not only provides the freedom to choose their educational practices but also makes the employee responsible for practices as well as results (Skaalvik & Skaalvik, 2014).

Competence is described as a sense of ability, not of competing with others; it refers to when humans feel capable or efficient to achieve what they intend to do. According to Deci & Ryan (2000), it is the deep desire to feel capable and effective to intervene in their environment and achieve valuable results. In the work setting, employees that feel competent believe that they can dominate challenges, reach goals, develop new abilities, and adapt to changing environments (Van den Broeck et al., 2008a).

Relatedness refers to feeling connected and respected by others and having the feeling of belonging to the group (Ryan & Deci, 2017). The need to be in a relationship with others (e.g., with co-workers) without worrying about achieving a result; it involves the psychological meaning of being in communion or union with others (Deci & Ryan, 2002).

SDT postulates that the type of acquired motivation that leads our experience in work and life, in general, is influenced by the satisfaction or frustration of our basic psychological needs (Ryan & Deci, 2017). In this sense, SDT conceptualizes motivation in various aspects that represent a different form of motivational regulation (Deci & Ryan, 1985, 2000; Gagné & Deci, 2005) and explain the degree to which behaviors are volitional or self-determined through a motivational continuum ranging from the least self-determined (amotivation) to the most self-determined (intrinsic motivation) through different intermediate levels (extrinsic motivation).

An intrinsically motivated employee (e.g., a teacher) will be involved in an activity for the pleasure and satisfaction it generates. Teachers that participate in activities because of the effects that they derive from them will be extrinsically motivated and therefore their behavior will be guided by distinct extrinsic regulations according to the continuum of self-determination. The least autonomous regulation is external and refers to the performance of behavior to obtain a reward or avoid punishment. Introjected regulation is when behavior is done to avoid guilt or shame. Identified regulation occurs when a person chooses to act because the behavior or its result is personally important and is created when the teacher values and accepts the benefits linked to the activity. Integrated regulation is when the teacher has internalized the reasons for participating in a behavior. Finally, teachers without motivation will be those who have no intention of performing any activity; in other words, they are not intrinsically or extrinsically motivated.

According to SDT, the satisfaction of psychological needs is associated with more autonomous regulations (intrinsic, integrated, and identified) which lead to wellbeing, self-realization, adaptation, and optimal functioning (Deci & Ryan, 2000). In contrast, when they are frustrated; i.e., the negative feeling experienced by an individual when he or she appreciates that his or her psychological needs are being actively limited by the action of significant others (e.g., the direct superior), it is associated with less autonomous regulations (introjected, external, and amotivation) which lead to increased discomfort, distress, and poor functioning (Bartholomew et al., 2011; Deci & Ryan, 2000; Sheldon, 2011).

Within the work context, basic psychological needs are the variables included in SDT that are used more frequently as predictive factors of work results. Research in this regard has found that satisfaction of

the three needs leads to less fatigue (Van den Broeck et al., 2008b) and less organizational deviation by the employees (Lian et al., 2012).

Today, there is a scale called the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) created by Chen et al. (2015) and validated in four cultures and languages from different countries: China, Belgium, the United States, and Peru. The scale is designed for a general context and consists of 24 items with a multidimensional structure of six factors that measure the satisfaction and frustration of each of the respective psychological factors. The sample consisted of 1,051 university students and four items per need were recognized with an internal consistency by dimension with values of .64 and .89. The six-factor model presented a good fit of the data with the complete sample,  $SBS-\chi^2(231) = 372.71$ ,  $CFI = .97$ ,  $RMSEA = .03$  and  $SRMR = .04$ .

Later, Liga et al. (2018) translated and validated the BPNSFS in Italian in a sample of young individuals and adults of different ages in a general context. The results demonstrated an adequate equivalence of the six-factor model showing general homogeneity with regard to the measured constructs (vitality, depression, and self-esteem). The results of this study suggest that the subscales of satisfaction and frustration for each need could be treated separately since they could have unique effects that should be explored.

Currently, no adapted and validated scales have been found in the Spanish language that measure the satisfaction and frustration of basic psychological needs (BPN) in the work context. This restricts the study of this area in Mexico and because of the importance and effect that BPN have in achieving the psychological wellbeing of individuals (Deci & Ryan, 2000; Sheldon, 2011), it becomes necessary to have reliable instruments that are adapted to the Mexican work context, that measure these constructs together and have an adequate number of items. Therefore, the aim of this study is to adapt the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS; Chen et al., 2015) to the educational work context of Mexico and examine its psychometric properties, structure, and factorial invariance through gender groups.

## Method

This was a quantitative study with an instrumental design to evaluate the psychometric properties of the scale that measures the satisfaction and frustration of basic psychological needs in the educational work context (Ato et al., 2013) with a non-probabilistic convenience sample.

### Participants

A total of 568 basic education teachers (63% women and 37% men) from 74 state (19.4%) and federal (80.6%) schools from Northeast Mexico participated. Their age was between 18 and 63 years ( $M_{age} = 37.37$ ;  $SD = 10.37$ ). The majority were married (56.6%), followed by singles (29.9%), and the rest were minimum percentages distributed between widowers (1.9%), common law (5.6%), divorced (4.8%) and separated (1.3%). Regarding their employment situation, the majority mentioned that they had an indefinite contract or tenure (81.5%), followed by those under contract (17.1%), and the rest were doing their social service or an internship (1.4%).

### Instruments

The satisfaction and frustration of teachers were measured with a version of the BPNSFS (Chen et al., 2015) translated into Mexican Spanish and adapted to the work context of the teachers. The scale consists of 24 items divided into six subscales that can be grouped into two factors: satisfaction of basic psychological needs (SBPN) and frustration of basic psychological needs (FBPN). Three variables comprise each of these factors; SBPN consists of autonomy satisfaction (AS), competence satisfaction (CS), and relatedness satisfaction (RS). On the other hand, FBPN consists of autonomy frustration (AF), competence frustration (CF), and relatedness frustration (RF). Each of the variables was measured with four items (see Table 1). All of the items were answered with a Likert-type scale where 1 was totally false and 5 totally true.

The extrinsic and intrinsic motivation of teachers was measured with the Work Extrinsic and Intrinsic Motivation Scale (WEIMS) of Tremblay et al. (2009) translated into Mexican Spanish and adapted to the teachers' work context. The WEIMS is designed to measure the different types of motivation and regulations in the work context. It consists of 18 items, divided into six subscales: intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation, with three items per subscale. All items are answered with a Likert-type scale that ranges from 1 (do not agree at all) to 5 (completely agree).

### **Procedure**

This study was conducted according to the ethics standards recommended by the American Psychological Association. Authorization was requested through official letters addressed to the authorities of the school zone and each of the school principals explaining the objectives and procedure of the research accompanied by a model of the instrument. Later, authorization was requested from the teachers for the application of scales taking into account the main inclusion criteria: being teachers in their respective grades and giving their consent to complete the questionnaire. Teachers were informed of the objective of the study, its voluntary aspect, the absolute confidentiality of the answers, and the handling of the data. They were also informed that there were no correct or incorrect answers and they were asked to be sincere and honest. The questionnaire was individually self-administered and answered anonymously on a workday.

The BPNSFS and the WEIMS were translated into Mexican Spanish according to the translation-back translation procedure (Hambleton & Kanjee, 1995). The translation was carried out by a professional translator hired by the researchers. To adapt the scales to the educational work context, a group of experts was formed consisting of two doctors in science who are specialists with previous experience in the validation of psychological instruments and a specialist in the field of occupational and organizational psychology. They discussed the discrepancies of the translation to reach the first version of the instrument in Mexican Spanish.

### **Data Analysis**

First, a descriptive analysis was performed for the entire satisfaction and frustration scale and the factors that comprise it. To test the factorial structure of the questionnaire, confirmatory factor analyzes (CFA) of the two proposed models (two and six factors) were performed. Taking into account the number of response options of the observable variables ( $k \geq 5$ ) and that most of the skewness and kurtosis values had a moderately non-normal distribution (skewness  $< 2$  and kurtosis  $< 7$ ), the CFA were performed with the maximum likelihood (ML) method (Finney & DiStefano, 2006) and the polychoric correlation matrix and asymptotic covariance were used as input.

The adequacy of the models was analyzed with different fit indexes such as the comparative fit index (CFI), the non-normed fit index (NNFI), and the root mean square error of approximation (RMSEA). CFI and NNFI values greater or equal to .95 indicate an acceptable fit (Hu & Bentler, 1999). For the RMSEA, values equal to or lower than .08 were considered satisfactory (Cole & Maxwell, 1985).

To determine which of the two models (two and six factors) had a better fit to the data, the differences between the goodness of fit indexes of the models were analyzed. Differences not greater than .01 between the NNFI and the CFI (Cheung & Rensvold, 2002) and of .015 between the RMSEA values (Chen, 2007) were considered irrelevant in the model comparison. A multisample CFA was performed to examine the factor invariance of the instrument, considering the same criteria described above.

The internal consistency of the instrument was evaluated with Cronbach's alpha (Cronbach, 1951). Analyzes were carried out with the statistical package SPSS V.21 and the LISREL 8.80 program (Jöreskog & Sörbom, 2006).

## Results

### Descriptive analysis and normality

The descriptive results of each of the items, variables, and factors that comprise the scale are shown in Table 1. The results show higher SBPN values than FBPN in teachers. In particular, competence was the psychological need that obtained the highest satisfaction values. On the other hand, autonomy was the psychological need that obtained the highest frustration values. Most of the skewness and kurtosis values were within the range of skewness  $< 2$  and kurtosis  $< 7$ , indicating a moderately non-normal distribution (see Table 1).

**Table 1**

*Descriptive and Standardized Solution of the items and subscales of the instrument*

Subscales		<i>M</i>	<i>SD</i>	<i>S</i>	<i>K</i>
<b>Cuando estoy en mi trabajo...</b>					
	Satisfacción de las Necesidades Psicológicas Básicas	4.36	.55	-.93	.69
	Satisfacción de Autonomía	4.24	.66	-.87	.72
1	...siento que tengo la libertad y posibilidad de elegir las cosas que asumo.	4.30	.82	-1.29	2.06
7	...siento que mis decisiones reflejan lo que realmente quiero.	4.13	.97	-1.25	1.63
13	...siento que mis elecciones expresan lo que realmente soy.	4.36	.97	-1.75	3.05
19	...siento que he estado haciendo lo que realmente me interesa.	4.18	.99	-1.30	1.39
	Satisfacción de Relaciones	4.26	.70	-1.03	1.24
3	...siento que le importo a las personas que también son importantes para mí.	4.26	.92	-1.36	1.72
9	...me siento conectado con las personas que se preocupan por mí y por las cuales yo me preocupo.	4.20	1.04	-1.15	2.22
15	... me siento cerca y conectado(a) con otras personas que son importantes para mí.	4.32	.91	-1.41	1.80
21	...tengo una sensación de calidez cuando estoy con las personas con los que paso tiempo.	4.26	.93	-1.29	1.41
	Satisfacción de Competencia	4.57	.60	-1.65	2.43
5	...siento que puedo hacer las cosas bien.	4.62	.77	-2.51	6.96
11	...me siento capaz de lo que hago.	4.59	.83	-2.58	7.30
17	...siento que soy capaz de alcanzar mis metas.	4.40	.89	-1.74	3.08
23	...siento que puedo cumplir con éxito las tareas difíciles.	4.66	.70	-2.68	8.51
	Frustración de las Necesidades Psicológicas Básicas	1.95	.89	1.26	.99
	Frustración de Autonomía	2.22	1.00	.72	-.32
2	...siento que la mayoría de las cosas que hago, las hago porque “tengo que hacerlas”.	2.19	1.31	.74	-.70
8	...me siento forzado(a) a hacer muchas cosas que yo no elegiría hacer.	2.13	1.30	.80	-.62
14	...me siento presionado(a) a hacer muchas cosas.	2.06	1.27	.88	-.40
20	...mis actividades diarias se sienten como una cadena de obligaciones.	2.51	1.28	.42	-.84
	Frustración de Relaciones	1.84	1.00	1.31	.79
4	...me siento excluido del grupo al que quiero pertenecer.	1.66	1.16	1.62	1.41
10	...siento que las personas que son importantes para mí son frías y distantes conmigo.	1.94	1.32	1.13	-.07
16	...tengo la impresión de que le disgusto a la gente con la que paso tiempo.	2.12	1.26	.81	-.52
22	...siento que las relaciones interpersonales que tengo son superficiales.	1.66	1.19	1.64	1.34
	Frustración de Competencia	1.79	.94	1.36	1.19
6	...tengo serias dudas acerca de si puedo hacer las cosas bien.	1.93	1.25	1.04	-.26

12	...me siento decepcionado(a) con muchas de mis actuaciones.	1.88	1.31	1.23	.12
18	...me siento inseguro(a) de mis habilidades.	1.53	1.07	1.97	2.81
24	...me siento como un(a) fracasado(a) por los errores que cometo.	1.80	1.25	1.43	.79

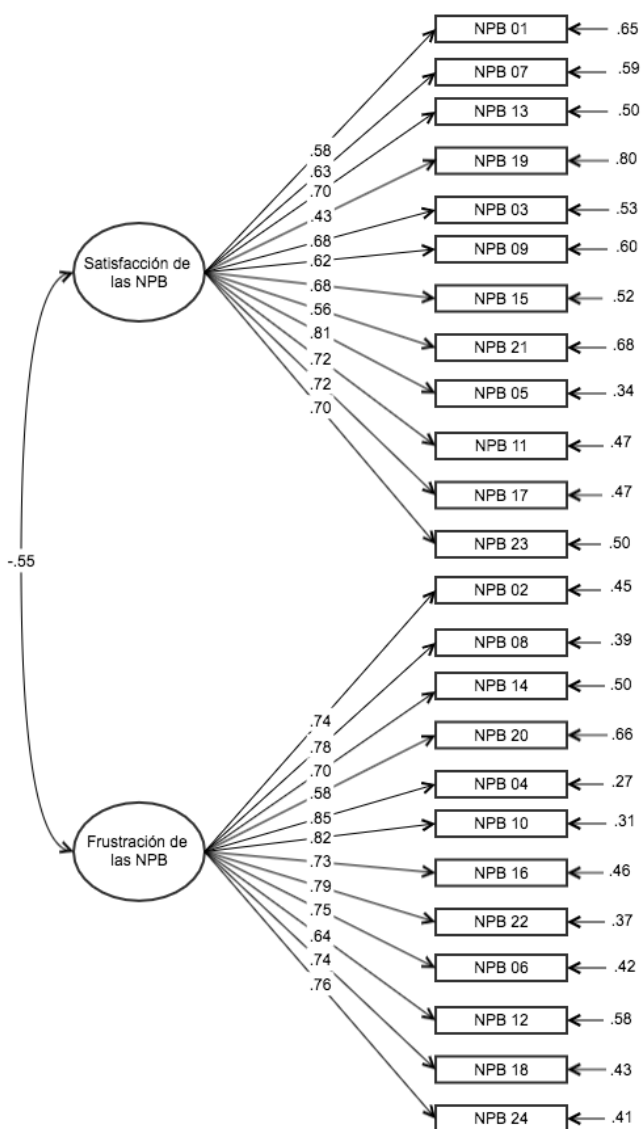
Note. *M* = Means, *SD* = Standard deviations, *S* = Skewness, *K* = Kurtosis. All the saturations were significant,  $t > 1.96, p < .05$ .

### Confirmatory factor analysis and comparison of models

The goodness-of-fit indexes of the two-factor model (Figure 1) were satisfactory ( $SBS\chi^2/df = 3.198$ , NNFI = .976, CFI = .978, RMSEA = .062), as well as the six-factor model ( $SBS\chi^2/df = 2.053$ , NNFI = .989, CFI = .990 and RMSEA = .043) (see Figure 2). However, after comparing the goodness-of-fit indexes of the two models, relevant differences were found ( $\Delta NNFI = .013$ ,  $\Delta CFI = .012$  and  $\Delta RMSEA = .019$ ); therefore, the model that best fit the data for the rest of the analyzes, the six-factor model, was chosen.

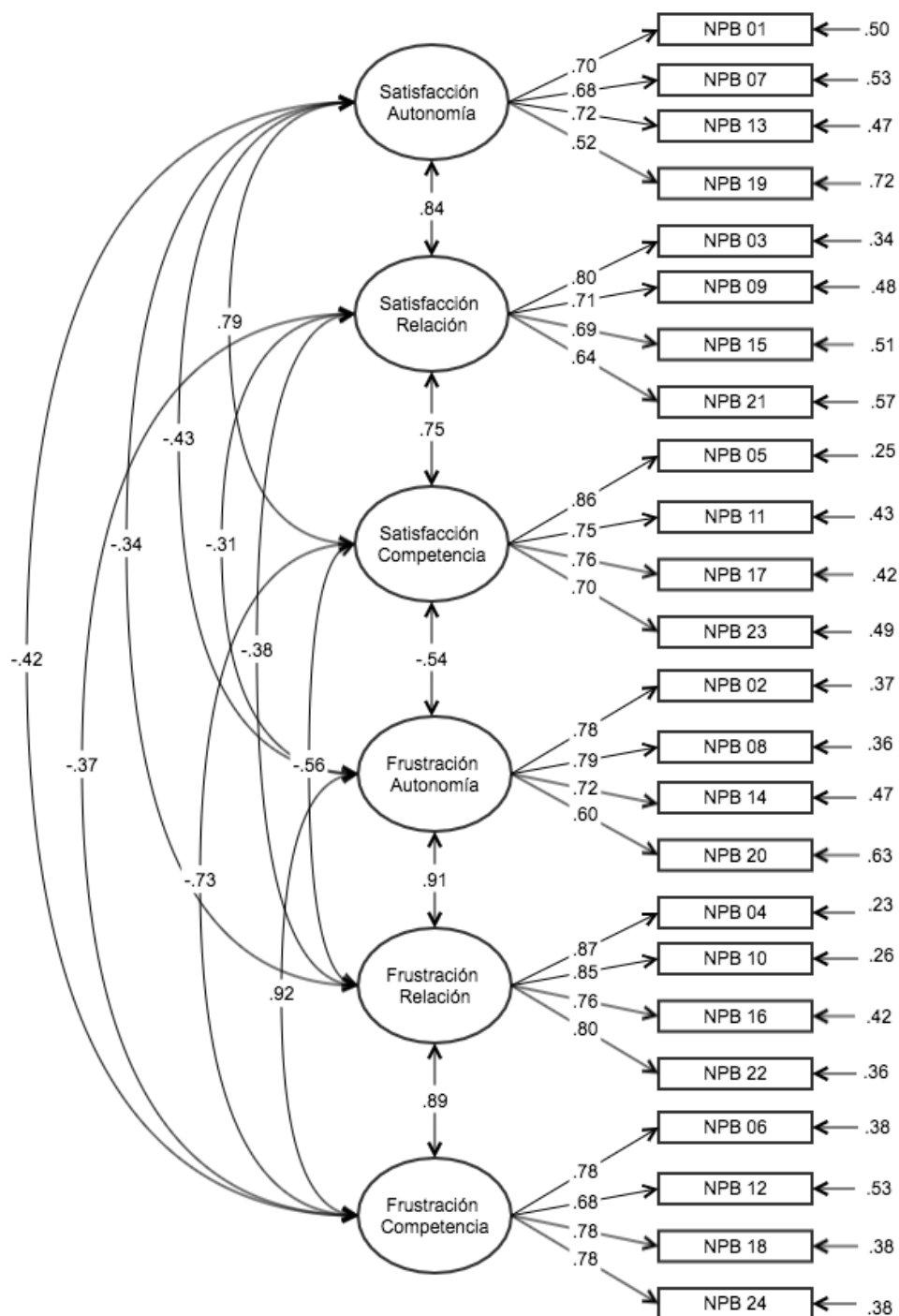
**Figure 1**

*Two-factor model of the satisfaction and frustration scale of basic psychological needs*



**Figure 2**

*Six-factor model of the satisfaction and frustration scale of basic psychological needs*



### Reliability

The results of the reliability analysis revealed alpha values of .65 to .74 for AS, RS, and CS. This situation was similar for AF, RF, and CF, which had alpha values of .76 to .83. Nevertheless, the internal consistency of the scales that assess SBPN and FBPN as a global measure had good reliability with alpha

values of .84 and .91, respectively. Likewise, the alpha values of the subscales that measure the different regulations varied from .65 to .76 (see Table 2).

**Correlation between factors and criterion validity**

Pearson's correlation analysis of the study variables revealed that the SBPN had strong positive correlations with AS, RS, CS, moderate correlations with intrinsic motivation and integrated regulation, low correlations with identified and introjected regulation, very low correlations with external regulation, and moderate negative correlations with the FBPN and its respective subscales AF, RF and CF, in addition to a weak negative correlation with amotivation. On the other hand, FBPN had strong positive significant correlations with AF, RF, and CF, moderate correlations with amotivation, weak correlations with external regulation, weak negative correlations with AS, RS, intrinsic regulation, and moderate correlations with CS (see Table 2). These results support the convergent and discriminant validity of the BPNSFS.

**Table 2**

*Bivariate correlations and internal consistency of the all variables of study*

	<i>M</i>	<i>SD</i>	$\alpha$	1	2	3	4	5	6	7	8	9	10	11	12	13
1. BPNS	4.41	.48	.84	1												
2. BPNF	1.90	.85	.91	-.39**	1											
3. Autonomy S.	4.30	.60	.65	.81**	-.28**	1										
4. Relatedness S.	4.31	.66	.72	.85**	-.23**	.52**	1									
5. Competence S.	4.62	.52	.74	.75**	-.46**	.41**	.46**	1								
6. Autonomy F.	2.17	.98	.78	-.36**	.89**	-.32**	-.20**	-.36**	1							
7. Relatedness F.	1.80	.98	.83	-.33**	.91**	-.20**	-.23**	-.38**	.71**	1						
8. Competence F.	1.74	.90	.76	-.36**	.89**	-.23**	-.19**	-.49**	.68**	.72**	1					
9. Intrinsic R.	5.89	1.01	.73	.48**	-.13**	.48**	.33**	.34**	-.15**	-.08	-.12**	1				
10. Integrated R.	6.02	.96	.76	.43**	-.07	.45**	.32**	.27**	-.12**	-.02	-.06	.64**	1			
11. Identified R.	5.60	1.19	.65	.38**	.01	.43**	.25**	.22**	-.03	.04	.02	.58**	.62**	1		
12. Introjected R.	5.32	1.40	.71	.25**	.09*	.31**	.17**	.13**	.08	.09*	.08	.49**	.49**	.53**	1	
13. External R.	4.74	1.30	.66	.10*	.25**	.15**	.09*	-.01	.21**	.24**	.23**	.30**	.32**	.51**	.38**	1
14. Amotivation	3.44	1.52	.65	-.18**	.54**	-.09*	-.09*	-.27**	.50**	.47**	.47**	.007	.05	.11**	.25**	.33**

Note. The values of *M* = Mean, *SD* = Standard deviations;  $\alpha$  = Cronbach alpha; S = Satisfaction; F = Frustration; BPN = Basic Psychological Needs; \**p* < .05; \*\**p* < .01.

**Factor Invariance Through Gender**

Based on the results obtained in the CFA, invariance was evaluated according to the groups by gender of the participants of the six-factor model, using maximum likelihood as the estimation method. A preliminary analysis separately examined the structure of the BPNSFS in the men (Model M0a) and women (Model M0b) sample. As seen in Table 3, the goodness-of-fit indexes of the M0a and the M0b models were satisfactory with all the estimated parameters being statistically significant (*p* < .05).

Afterward, a multisample analysis was performed (see Table 3). Model 1 (M1) examined the structural invariance of the BPNSFS in the two groups analyzed, showing that the goodness-of-fit indexes were satisfactory; therefore, it was concluded that the factorial structure of the instrument is invariant in the two groups compared. M1 was used as the basis for the following nesting constraints.

Model 2 (M2), which tested the equivalence of factor saturations across the group of men and women, showed adequate fit indexes. After comparing these indexes with those of M1, the differences did not exceed the criterion values ( $\Delta CFI < .01$  y  $\Delta NNFI < .01$ ;  $\Delta RMSEA < .015$ ); thus, this study presents evidence of the invariance of factor saturations of the BPNSFS through the evaluated sample.

Model 3 (M3) or the “strong factor invariance model” (Meredith, 1993), which adds the equivalence of the intercepts, showed satisfactory goodness-of-fit indexes. The values obtained from the differences between the CFI, the NNFI and the RMSEA of M3 and M1 did not exceed the criterion values (see Table 3); therefore, it can be concluded that the equivalence of factor saturations and intercepts is accepted when the invariance is fulfilled for all the parameters.

Finally, Model 4 (M4) or the “strict factor invariance model” (Meredith, 1993), which adds invariance to the factor saturations, intercepts, and errors, also presented satisfactory goodness-of-fit indexes. As in the previous comparison, the difference between the CFI, the NNFI, and the RMSEA of



M4 and M1 did not exceed the criterion values. These results support the strict factor equivalence of the BPNSFS through gender groups.

**Table 3**

*Goodness of fit indexes of invariance models*

Model	Model description	df	SB $\chi^2$	RMSEA	(90% CI)	NNFI	CFI	$\Delta$ NNFI	$\Delta$ CFI	$\Delta$ RMSEA
M0a	Baseline model boys	237	362.617**	.050	(.040-.061)	.986	.988			
M0b	Baseline model girls	237	376.157**	.041	(.033-.048)	.989	.991			
M1	Structural invariance (Baseline model)	484	752.333**	.044	(.038-.050)	.988	.989			
M2	FL invariance	502	782.566**	.044	(.038-.050)	.988	.989	.000	.000	.000
M3	FL + INT invariance	520	799.708**	.044	(.038-.050)	.988	.989	.000	.000	.000
M4	FL + Inv.+ Error invariance	544	801.637**	.041	(.035-.047)	.990	.990	.002	.001	.003

Note. df = degrees of freedom; RMSEA = root mean square error of approximation; 90% CI = 90% confidence interval for the RMSEA; NNFI = non-normed fit index; CFI = comparative fit index; Inv. = Invariance; FL = factor loadings; INT = intercepts. All comparisons in the  $\Delta$  indices are made with respect to the baseline model (M1). \*\* =  $p < .01$ .

## Discussion

The aim of this study was to adapt the Basic Psychological Need Satisfaction and Frustration Scale (Chen et al., 2015) to the educational work context of Mexico and examine its psychometric properties, structure, and factorial invariance through gender groups.

The results of the CFA revealed a good fit of the data of the proposed models (two and six factors). These results are consistent with those obtained in the Italian version by Liga et al. (2018) who also carried out a comparison of two- and six-factor models with a satisfactory fit; however, the instrument was designed for a general context.

Regarding the comparison of models, the six-factor model, which distinguishes the dimensions of satisfaction and frustration of the three basic needs (AS, RS, CS, AF, RF, and CF), had the best fit indexes. These findings are aligned and were consistent with results of previous research by Longo et al. (2014), Nishimura and Suzuki (2016), and Costa et al. (2018) in the educational and work context, as well as in the general context version prepared by Chen et al. (2015). Thus, our data confirm that both satisfaction and frustration of the three needs are best represented with a six-factor structure. However, despite the fact that in the present study there are relevant differences between the two proposed models, the results of the confirmatory factor analysis show a satisfactory fit of the data; therefore, the instrument can be used in both ways; that is, to evaluate the six different variables separately (AS, RS, CS, AF, RF, and CF) and as a global measure of SBPN and FBPN, in a valid way according to the specific purpose of each study, since the two models fit well and their reliability coefficients are acceptable.

Likewise, the results of the correlation analysis between the dimensions (SBPN and FBPN) and their respective factors (AS, RS, CS, AF, RF, and CF) revealed positive and significant relationships with each other, as well as a significant negative correlation between SBPN and FBPN. These correlations similarly coincide with results reported in other studies that have used the same instrument (Liga et al., 2018; Nishimura & Suzuki, 2016). Furthermore, the SBPN had significant positive correlations with intrinsic motivation, integrated, identified, and introjected regulation, and weak negative correlations with amotivation. On the other hand, the FBPN presented moderate positive and significant correlations with amotivation, weak correlations with external regulation, and weak negative correlations with intrinsic regulation. Our results coincide with other studies where it was established that the more autonomous the type of motivation, the stronger its positive relationship with the satisfaction of psychological needs such as autonomy (Nie et al., 2014). These results support the convergent and discriminant validity of the instrument.

Finally, the multisample confirmatory factor analysis supported the strict factor invariance of the six-factor structure of BPNSFS in gender groups. This suggests that the instrument similarly measures regardless of the gender of the participant and allows impartial comparisons of the mean scores between

the groups of men and women (Sass, 2011). Thus, the results of the study are consistent with previous studies that have shown invariance through gender (Costa et al., 2018) and age (Liga et al., 2018; Cordeiro et al., 2016) in the general and educational context. Therefore, the Basic Psychological Need Satisfaction and Frustration Scale in the work context (BPNSFS-WC) is an important contribution to the scientific community interested in studying the work context in Mexican culture.

## Conclusions

The Basic Psychological Needs Satisfaction and Frustration Scale in the Work Context (BPNSFS-WC) is a valid and reliable instrument that can be used to measure the satisfaction and/or frustration of teachers' BPNs and to make comparisons between gender groups using either the two (SBPN and FBPN) or six-factor (AS, RS, CS, AF, RF, and CF) model according to the objective of each study since different authors (Bartholomew et al., 2011; Costa et al., 2015; Sheldon & Hilpert, 2012) suggest that the satisfaction and frustration of each need could have unique effects that should be examined. Thus, the BPNSFS-WC is a useful instrument to increase knowledge and scientific production in this area in Mexico, since its factor structure coincides with that used in previous works and it is consistent with the assumptions of the theory of self-determination (Deci & Ryan, 1985, 2002; Ryan & Deci, 2017).

This study also has some limitations. The participants in this work only included Mexican basic education teachers; therefore, we suggest including population from different educational levels in future research. Also, the study of the psychometric properties of the instrument could be expanded to populations from other Spanish-speaking countries and thus contribute to the ability to carry out cross-cultural studies.

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## References

- Ato, M., López, J., & Benavente, A. (2013). Un sistema de clasificación de los diseños de investigación en psicología. *Anales de Psicología*, 29(3), 1038-1059. <https://doi.org/10.6018/analesps.29.3.178511>
- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., & Thogersen-Ntoumani, C. (2011). Psychological need thwarting in the sport context: assessing the darker side of athletic experience. *Journal of Sport and Exercise Psychology*, 33(1), 75-102. <https://doi.org/10.1123/jsep.33.1.75>
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, T., Ryan, R. M., Sheldon, K., Soenens, B., Petegem, S. V., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, 39(2), 216-236. <https://doi.org/10.1007/s11031-014-9450-1>
- Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, 14(3), 464-504. <https://doi.org/10.1080/10705510701301834>
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9(2), 233-255. [https://doi.org/10.1207/S15328007SEM0902\\_5](https://doi.org/10.1207/S15328007SEM0902_5)
- Cole, D. A., & Maxwell, S. E. (1985). Multitrait-multimethod comparisons across populations: a confirmatory factor analytic approach. *Multivariate Behavioral Research*, 20(4), 389. [https://doi.org/10.1207/s15327906mbr2004\\_3](https://doi.org/10.1207/s15327906mbr2004_3)
- Cordeiro, P., Paixão, P., Lens, W., Lacante, M., & Luyckx, K. (2016). The Portuguese validation of the Basic Psychological Need Satisfaction and Frustration Scale: Concurrent and longitudinal relations to well-being and ill-being. *Psychologica Belgica*, 56(3), 193-209. <https://doi.org/10.5334/pb.252>
- Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334. <https://doi.org/10.1007/BF02310555>

- Costa, S., Ntoumanis, N., & Bartholomew, K. J. (2015). Predicting the brighter and darker sides of interpersonal relationships: Does psychological need thwarting matter? *Motivation and Emotion*, 39(1), 11-24. <https://doi.org/10.1007/s11031-014-9427-0>
- Costa, S., Ingoglia, S., Inguglia, C., Liga, F., Lo Coco, A., & Larcán, R. (2018). Psychometric evaluation of the basic psychological need satisfaction and frustration scale (BPNSFS) in Italy. *Measurement and Evaluation in Counseling and Development*, 51(3), 193-206. <https://doi.org/10.1080/07481756.2017.1347021>
- Deci, E. L., & Ryan, R. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior* (1st ed.). Springer US. <https://doi.org/10.1007/978-1-4899-2271-7>
- Deci, E. L., & Ryan, R. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry*, 11(4), 227-268. [https://doi.org/10.1207/S15327965PLI1104\\_01](https://doi.org/10.1207/S15327965PLI1104_01)
- Deci, E. L., & Ryan, R. (2002). *Handbook of self-determination research*. University of Rochester Press.
- Deci, E. L., & Ryan, R. M. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology*, 49(1), 14-23. <https://doi.org/10.1037/0708-5591.49.1.14>
- De Meyer, J., Tallir, I. B., Soenens, B., Vansteenkiste, M., Aelterman, N., Van den Berghe, L., Speleers, L., & Haerens, L. (2014). Does observed controlling teaching behavior relate to students' motivation in physical education? *Journal of Educational Psychology*, 106, 541-554. <https://doi.org/10.1037/a0034399>
- Finney, S. J. & DiStefano, C. (2006). Chap. 9 Non-normal and categorical data in structural equation modeling. In G. R. Hancock y R. O. Mueller (Eds.) *Structural Equation Modeling: a second course* (pp. 269-314). Information Age Publishing.
- Gagné, M., Chemolli, E., Forest, J., & Koestner, R. (2008). A temporal analysis of the relation between organizational commitment and work motivation. *Psychologica Belgica*, 48, 219-241. <https://doi.org/10.5334/pb-48-2-3-219>
- Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, 26(4), 331-362. <https://doi.org/10.1002/job.322>
- Hambleton, R. K., & Kanjee, A. (1995). Increasing the validity of cross-cultural assessments: Use of improved methods for test adaptations. *European Journal of Psychological Assessment*, 11(3), 147-157. <https://doi.org/10.1027/1015-5759.11.3.147>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1-55. <https://doi.org/10.1080/10705519909540118>
- Jöreskog, K., & Sörbom, D. (2006). LISREL. *Structural equation modeling with the simplis command language* (Versión 8.80) [Computer Software]. Chicago, IL: Scientific Software International.
- Lian, H., Ferris, D. L., & Brown, D. J. (2012). Does taking the good with the bad make things worse? How abusive supervision and leader-member exchange interact to impact need satisfaction and organizational deviance. *Organizational Behavior and Human Decision Processes*, 117(1), 41-52. <https://doi.org/10.1016/j.obhdp.2011.10.003>
- Liga, F., Ingoglia, S., Cuzzocrea, F., Inguglia, C., Costa, S., Lo Coco, A & Larcán, R. (2018): The Basic Psychological Need Satisfaction and Frustration Scale: construct and predictive validity in the Italian context. *Journal of Personality Assessment*, 100(2), 1-11. <https://doi.org/10.1080/00223891.2018.1504053>
- Longo, Y., Gunz, A., Curtis, G. J., & Farsides, T. (2014). Measuring need satisfaction and frustration in educational and work contexts: The Need Satisfaction and Frustration Scale (NSFS). *Journal of Happiness Studies*, 17(1), 295-317. <https://doi.org/10.1007/s10902-014-9595-3>
- Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika*, 58(4), 525-543. <https://doi.org/10.1007/bf02294825>
- Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, 96(1), 71-94. <https://doi.org/10.1037/a0021484>
- Nie, Y., Chua, B. L., Yeung, A. S., Ryan, R. M., & Chan, W. Y. (2014). The importance of autonomy support and the mediating role of work motivation for well-being: testing self-determination theory in a Chinese work organization. *International Journal of Psychology*, 50(4), 245-255. <https://doi.org/10.1002/ijop.12110>
- Nishimura, T., & Suzuki, T. (2016). Basic psychological need satisfaction and frustration in Japan: controlling for the big five personality traits. *Japanese Psychological Research*, 58(4), 320-331. <https://doi.org/10.1111/jpr.12131>

- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press. <https://doi.org/10.1521/978.14625/28806>
- Sass, D. A. (2011). Testing measurement invariance and comparing latent factor means within a confirmatory factor analysis framework. *Journal of Psychoeducational Assessment*, 29(4), 347-363. <https://doi.org/10.1177/0734282911406661>
- Sheldon, K. M. (2011). Integrating behavioral- motive and experimental- requirement perspectives on psychological needs: A two process model. *Psychological Review*, 118(4), 552-569. <https://doi.org/10.1037/a0024758>
- Sheldon, K. M., & Hilpert, J. C. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, 36(4), 439-451. <https://doi.org/10.1007/s11031-012-9279-4>
- Skaalvik, E. M., & Skaalvik, S. (2014). Teacher self-efficacy and perceived autonomy: relations with teacher engagement, job satisfaction, and emotional exhaustion. *Psychological Reports: Employment Psychology y Marketing*, 114(1), 68-77. <https://doi.org/10.2466/14.02.PR0.114k14w0>
- Tremblay, M. A., Blanchard, C. M., Taylor, S., Pelletier, L. G., & Villeneuve, M. (2009). Work Extrinsic and Intrinsic Motivation Scale: Its value for organizational psychology research. *Canadian Journal of Behavioural Science/Revue Canadienne des Sciences du Comportement*, 41(4), 213-226. <https://doi.org/10.1037/a0015167>
- Van den Broeck, A., Vansteenkiste, M., & De Witte, H. (2008a). Self-determination theory: A theoretical and empirical overview in occupational health psychology. En J. Houdmont y S. Leka (Eds.), *Occupational health psychology: European perspectives on research, education, and practice* (pp. 63-88). Nottingham University Press.
- Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008b). Explaining the relationships between job characteristics, burnout and engagement: The role of basic psychological need satisfaction. *Work & Stress*, 22(3), 277-294. <https://doi.org/10.1080/02678370802393672>