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EVIDENCE SUPPORTING NEED SATISFACTION AND FRUSTRATION AS TWO DISTINGUISHABLE CONSTRUCTS.

Evidencias a favor de considerar satisfacción y frustración de las necesidades psicológicas básicas como dos constructos diferenciados.

Ylenio Longo
University of Nottingham, Reino Unido
Manuel Alcaraz-Ibáñez manuelalcaraz74@gmail.com
Universidad de Almería , España
Alvaro Sicilia
Universidad de Almería, España

Abstract: **Background:** This paper aims to (1) investigate whether psychological need satisfaction and frustration are distinguishable constructs or part of a single continuum, and (2) to develop and validate the Spanish version of the Need Satisfaction and Frustration Scale (NSFS). **Method:** Confirmatory factor analysis (CFA) and exploratory structural equation models (ESEM) were tested using three samples (Ntotal = 959). **Results:** In all samples, a CFA model specifying satisfaction and frustration of each psychological need as distinguishable constructs fit the data better than models specifying them as part of a continuum, even after including method corrections (CFA) or cross-loadings (ESEM). Scale score reliabilities were adequate only when the satisfaction and frustration of each need were treated as distinguishable constructs. **Conclusions:** The paper provides strong support for specifying need satisfaction and frustration as distinguishable but correlated constructs, as well as adequate evidence of dimensionality, reliability and criterion validity for the Spanish version of the NSFS.

Keywords: Autonomy, competence, relatedness, factor analysis, self-determination theory.

Resumen: **Antecedentes:** este estudio pretende (1) investigar si satisfacción y frustración de las necesidades psicológicas básicas pueden ser considerados constructos diferenciados o integrantes de un único continuo, y (2) desarrollar y validar la versión española de la Need Satisfaction and Frustration Scale (NSFS). **Método:** aplicando técnicas de análisis factorial confirmatorio (CFA) y ecuaciones estructurales exploratorias (ESEM) diversos modelos fueron testados utilizando tres muestras (Ntotal = 959). **Resultados:** en todas las muestras, los modelos que consideraban satisfacción y frustración como constructos diferenciados mostraron un mejor ajuste que aquellos que consideraban dichas necesidades como partes de un continuo, incluso después de aplicar correcciones que ajustasen la posible presencia de efectos de método (CFA) o de cargas cruzadas (ESEM). Los valores de fiabilidad fueron adecuados solo cuando satisfacción y frustración fueron tratadas como constructos diferenciados. **Conclusiones:** se aportan evidencias que apoyan la conveniencia de tratar las percepciones de satisfacción y frustración de las necesidades psicológicas básicas como constructos diferenciados, así como la adecuada dimensionalidad, fiabilidad, y validez de criterio de la versión española de la NSFS.

Basic psychological needs theory posits that human beings possess innate psychological needs for autonomy, relatedness and competence (Deci & Ryan, 2000). Autonomy involves a sense of volition and perceived congruence between one's actions and one's self-perception. Relatedness consists in feeling loved and cared about. Competence involves feeling effective and capable of reaching desired outcomes. In order for individuals to achieve high levels of well-being, these psychological needs must be satisfied (Deci & Ryan, 2000). On the other hand, the subjective experience of deprivation of each need (i.e., need frustration) will undermine well-being (Deci & Ryan, 2000).

According to basic psychological needs theory, need frustration does not merely represent a lack of satisfaction but a separate construct (Vansteenkiste& Ryan, 2013). Supporting this distinction, need satisfaction was found to better predict well-being outcomes, such as positive affect, intrinsic motivation and engagement (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011; Longo, Gunz, Curtis, & Farsides, 2016). Conversely, need frustration better predicted ill-being outcomes, such as negative affect, exhaustion and burnout (Bartholomew et al., 2011; Longo et al., 2016). In summary, the fact that need satisfaction and need frustration exhibit different relationships to external outcomes provides evidence supporting the separation between the two.

Furthermore, results of confirmatory factor analyses (CFA) have supported models distinguishing satisfaction and frustration of each need and rejected models specifying need satisfaction and frustration as part of a continuum (Cordeiro, Paixão, Lens, Lacante, & Sheldon, 2016; Longo et al., 2016). For example, Cordeiro et al. (2016) found poor fit for a CFA model with 3 factors measuring both the satisfaction and frustration of each need. Conversely, good fit was found for a six correlated-factors model (autonomy satisfaction, autonomy frustration, relatedness satisfaction, relatedness frustration, competence satisfaction and competence frustration). Similar results were also found by Longo et al. (2016), although their modelling approach included some limitations, which are discussed below. Overall, these results suggest that measurement models of psychological needs adequately represent the data when need satisfaction and frustration are specified as distinguishable constructs.

However, one study found support for a three-factor model that did not differentiate between satisfaction and frustration items (Van den Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010). Based on these findings, the authors concluded that "satisfaction and frustration of each of the needs may best be conceived of as opposite poles of the same underlying continuum" (Van den Broeck et al., 2010, p. 995). From this perspective, it may be argued that these unidimensional psychological

needs may sometimes appear to have two dimensions due to several methodological issues (González-Cutre et al., 2015). One possibility in this regard would be that apparent multidimensionality arisen from careless responding. Indeed, simulation studies have shown that, in a questionnaire including positively and negatively-scored items, if only 10% of the responses are completed carelessly, factor analysis will support the inclusion of an additional factor on which only negatively-scored items would load, even though the construct measured is unidimensional (Woods, 2006).

In such a case, a method effect correction has been proposed to account for negative-item effects (Marsh, 1996), by allowing error variances among negatively- or positively-scored items of construct to correlate. These correlated errors reduce the methodological bias producing different responses to positive and negative items. For example, when examining Rosenberg's (1965) self-esteem scale, Marsh (1996) found that that the one-factor model including the method correction through correlated errors for negatively-scored items had a better fit than the two-factor model, suggesting that the scale actually reflects a single underlying dimension.

A similar correction could be applied to satisfaction and frustration items to assess their dimensionality (e.g., Models 1-3, Figure 1). For each psychological need, if a method corrected one- factor model fits the data better than a two-factor model, this would indicate that need satisfaction and frustration are part of the same continuum and their apparent differentiation is due to method effects. If a two-factor model fits better, this finding would provide evidence supporting the distinguishable character of both constructs.

Previous studies have generally tested whether psychological need satisfaction and frustration function as distinguishable constructs without using any method correction. For example, Longo et al. (2016) compared a model including 3 factors (autonomy, relatedness and competence) with a model with six factors (satisfaction and frustration of each need). In such a case, it is not surprising that the uncorrected three-factor model did not fit the data, as the effect of method variance was not considered. Furthermore, the six-factor model used in that study included several higher-order factors with many parameters, which can lead to underidentification unless potentially unreasonable constraints are imposed. Ideally, a three-factor model with a method correction should be compared to a model including six correlated factors measuring the respective satisfaction and frustration of each need. Using this modelling approach, a six-factor model has been found to fit the data better than one with three needs factors with a method correction (Cordeiro et al., 2016).

Additionally, it is possible that a 3-factor model does not fit the data due to cross-loadings among the items. In CFA, each item usually loads on only one factor, and any cross-loadings are fixed to zero. However, it is possible to specify exploratory factor analysis (EFA) models including cross-loadings within a structural equation modeling (SEM) framework

using exploratory structural equation modeling (ESEM, Asparouhov & Muthén, 2009). If a 3-factor ESEM fits the data better than a 6-factor CFA, it would indicate that need satisfaction and need frustration are parts of the same continuum, and any further multidimensionality may be due to cross-loadings caused by the imperfect nature of the items.

The present study will examine whether psychological need satisfaction and frustration are distinguishable constructs by comparing models with 3 factors (autonomy, competence and relatedness) including method corrections (CFA) and cross- loadings (ESEM) with a 6-factor CFA model with six separate but correlated factors (satisfaction and frustration of each need). To date, ESEM has not been commonly used with psychological needs data. Therefore, testing it and comparing it to CFA models should contribute interesting new findings to the literature.

Finally, the study aims to contribute to the literature by introducing the Spanish version of the Need Satisfaction and Frustration Scale (NSFS). To further validate the scale beyond tests of dimensionality and reliability, its criterion validity will be assessed. Based on previous findings (e.g. Bartholomew et al., 2011; Longo et al., 2016), need satisfaction (need frustration) was expected to correlate more strongly with well-being (ill- being) after controlling for need frustration (need satisfaction). If psychological need satisfaction and frustration exhibit similar correlations with well-being and ill-being outcomes, the findings would not support the criterion validity of the scale and would indicate that need satisfaction and frustration are parts of the same continuum. Conversely, the hypothesized relationships would provide evidence supporting the validity of the Spanish translation of the NSFS, which could then be used to further investigate psychological needs in Spanish-speaking populations.

Method

Participants

Two data sets were acquired from Longo et al.'s (2016) study. Sample 1 comprised 356 university students (75.93% female) recruited from two universities. Their age ranged from 17 to 62 (M = 24.18, SD = 7.51).One hundred and fifty three British students were recruited through social networking and email advertisements. They were asked to complete an online questionnaire and were compensated with an opportunity to win a £25 prize. Two hundred and three Australian students were recruited through a participant database, and received partial credit toward research participation requirements.

Sample 2 comprised 243 American individuals (39.09% female) recruited from the Amazon Mechanical Turk website. Their age ranged from 20 to 67 years (M = 31.59, SD = 9.05). Most participants were in full-time employment (85% and 15% in part- time employment). A small incentive of 20 cents USD was given after survey completion.
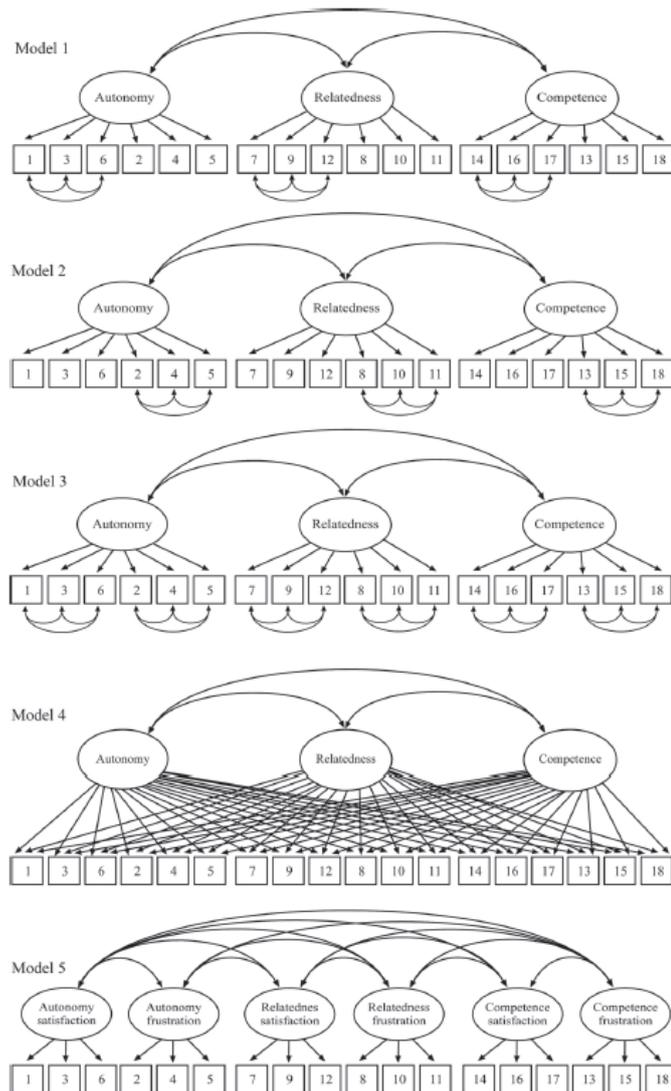
Figure 1.
Hypothesized CFA models

Sample 3 comprised 359 Spanish undergraduate students (42.90% female) from a university in southern Spain. Their age ranged from 17 to 50 (*M* = 21.76, *SD* = 3.52). The students volunteered to participate and did not receive any payment or other form of inducement. Participants completed questionnaires during class time in the presence of one of the researchers.

Instruments

Psychological need satisfaction and frustration in education and work. We used the 18-item Need Satisfaction and Frustration Scale (NSFS) (Longo et al., 2016). It comprises 6 items measuring each need (i.e., autonomy, relatedness and competence). For each need, 3 items measure need satisfaction and 3 items measure need frustration. Items were preceded by the stem "In my studies..." in sample 1 and 3, and the stem "In my job..." in sample 2. Items were scored on a 1 (*strongly disagree*)

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to 7 (*strongly agree*) response scale. Reliability estimates for the NSFS subscales in the three samples are presented in Table 2.

Positive and negative affect experienced in the educational context. We used the Spanish translation (Gargurevich, 2010) of the International Positive and Negative Affect Schedule-Short Form (I-Spanas-SF; Thompson, 2007). The I-Spanas-SF comprises 10 items, 5 measuring positive affect (e.g. "inspired") and 5 measuring negative affect (e.g. "upset") scored on a 1 (*never*) to 5 (*always*) response scale. In this study, I-Spanas-SF showed reliability estimates or omega hierarchical (ωh) = .59 (positive affect) and ωh = .53 (negative affect).

Academic Engagement. We used a Spanish translation (Parra & Pérez, 2010) of the Utrecht Work Engagement Scale for Students Short Form (UWES-S; Schaufeli & Bakker, 2003). The UWES-S comprises 9 items scored on a 0 (*never*) to 6 (*everyday*) response scale. In this study, the UWES-S showed a reliability value of ωh= .76.

Academic burnout. We used a Spanish translation adapted to university students (Boada-Grau & Merino-Tejedor, 2015) of the School Burnout Inventory (SBI-U; Salmela-Aro, Kiuru, Leskinen, & Nurmi, 2009). The SBI-U comprises 9 items scored on a 1 (*completely disagree*) to 6 (*completely agree*) response scale. In this study, the SBI-U showed a reliability value of ωh = .71.

Intrinsic motivation. We used 12 items focused on the intrinsic motivation to know, to experience stimulation and to accomplish things from the Spanish translation (Núñez, Martín-Albo, & Navarro, 2005) of the Academic Motivation Scale (Vallerand et al., 1992). Items are scored on a 1 (*not at all for this reason*) to 7 (*exactly for this reason*) response scale. Consistent with previous studies (e.g. Chemolli & Gagné, 2014), an overall intrinsic motivation score was calculated and this showed a reliability value of ωh = .77.

Procedure

NSFS was adapted into Spanish using back-translation (Muñiz, Elosua, & Hambleton, 2013). A group of 2 translators translated the scale into Spanish and, subsequently, a different group of 2 translators translated the Spanish version into English. The accuracy of the translation was judged qualitatively by all the translators, based on the degree of agreement between the original scale and the last version translated from Spanish. Then, a group of two psychology researchers assessed the content of the items in the Spanish version to examine their correspondence with the psychological construct they aimed to measure. Studies in all samples were granted ethical approval by their respective ethics committees.

Data analyses

The performed analyses involved factor analysis, discriminant validity analysis, reliability analysis and criterion validity analysis. CFA and ESEM

were performed with the lava an package version 0.5-20 (Rosseel, 2012) and the sem Tools package version 0.4-12 (semTools contributors, 2016) in R version 3.2.3 (R Core Team, 2015). The following fit indices were used to analyze model fit: the chi-square fit index ($\chi2$), the Comparative Fit Index (CFI), the Standardized Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), and the Bayesian Information Criterion (BIC). Considering the large size of the samples, $\chi2$ was not expected to support any model, by reaching non-significance. General guidelines indicate that CFI values in the .90-.95 range suggest acceptable fit, while values above .95 suggest good fit. SRMR values lower than .08 indicate acceptable fit. RMSEA values below .08 indicate acceptable fit, while values below .05 indicate close fit. Additionally, when comparing models, smaller BIC values are indicative of better fitting models (e.g. Brown, 2015).

Several models were tested (see Figure 1). Model 1 comprised three factors corresponding to the three psychological needs, and it corrected for method bias by correlating the error terms among the satisfaction items of each need. Model 2, also comprised three factors, but it corrected for method bias by correlating the error terms of the frustration items of each need. Model 3 comprised three factors and correlated errors among both satisfaction and frustration items for each need. Model 4 was a 3-factor ESEM, where all cross-loadings were estimated. Model 5 treated the satisfaction and frustration of each need as different but correlated constructs.

Despite previous research on basic needs has sometimes identified strong correlations among different subscales (e.g. Sicilia, Ferriz, & Saenz-Álvarez, 2013), discriminant validity of the NSFS had not been previously explored. To further test the adequacy of the six-factor model, its discriminant validity was tested using heterotrait-monotrait method (HTMT) described by Henseler, Ringle and Sarstedt (2014). HTMT values show the ratio of the inter-item correlations between scales to the inter-item correlations within scales. HTMT values are interpreted as inter- factor correlations and were estimated based on absolute item correlations using the semTools package (semTools contributors, 2016) in R.

With regards to reliability, McDonald's omega hierarchical (ωh) coefficient of reliability was estimated for each need as well as its respective subscales using the psych package version 1.5.8 (Revelle, 2015) (see Table 2). The ωh calculates reliability based on the factor analytic model and has been found to outperform Cronbach's α (Zinbarg, Revelle, Yovel & Li, 2005). Reliability coefficients were based on minres extraction and promax rotation.

To provide criterion validity for the Spanish version of the NSFS, a partial correlation analysis was performed for each NSFS subscale individually, after controlling for its respective satisfaction or frustration subscale.

Results

Preliminary analyses

Preliminary analyses were performed to ensure the data were adequate for factor analysis. In sample 1, less than 1% of the values were missing. One participant responded only to the first item on the scale and was therefore omitted. Most other cases had either no missing values (329), or no more than 4 missing values (26). Full information maximum likelihood was used to estimate these missing values in sample 1 (Graham, 2009). Samples 2 and 3 had no missing data because participants were required to respond to all questions to complete the task. In all three samples, univariate skewness and kurtosis values were below 2 and 7. However, Mardia's multivariate normality test exceeded a value of 5 ($p < .001$), indicating some multivariate non-normality. Therefore, robust maximum likelihood (MLR) estimation was used in confirmatory factor analyses (Brown, 2015). Simulation studies have shown that MLR performs as well as or better than robust categorical estimators for ordered polytomous variables including seven response categories (Rhemtulla, Brosseau-Liard, & Savalei, 2012).

Confirmatory factor analysis

The results of CFA are summarized in Table 1. The models correcting for positive or negative item bias only fit the data adequately in sample 1, with nearly adequate fit in sample 3 since the CFI was only slightly below .90. The model with correlated errors among both satisfaction and frustration items only converged to a proper solution and fit the data adequately in sample 1. The 3-factor ESEM model fit the data adequately only in sample 2. On the other hand, the six-factor model fit the data well and better than all other models in all samples. Item loadings and standard errors for the six-factor model are presented in Figure 2. Loadings were adequate in all three samples (sample 1: M = .74, range = .62 - .90; sample 2: M = .75, range = .63 - .83; sample 3: M = .73, range = .55 - .86) and all standard errors were below .07.

Discriminant validity

Meeting the most restrictive criterion proposed by Henseler et al., all HTMT values did not exceed an absolute value of .85, therefore supporting discriminant validity of the six NSFS scale scores (see Figure 2). That is, in every case, the correlations among items in the same subscale exceeded the correlations among items in different subscales. These results indicate that the satisfaction and frustration of each need do not overlap strongly enough to justify treating them as a single construct.

Reliability analysis

Results of reliability analyses (see Table 2) indicate that a single factor does not explain a sufficient amount of variance if we include the satisfaction and frustration of a need in a single scale (e.g. autonomy). In fact, in most cases, reliability of these aggregate scales was below .70, whereas a single factor generally explained an adequate amount of variance when the satisfaction and frustration of each need were analyzed as different scales. Despite the autonomy frustration subscale exhibiting reliabilities below .70 in two samples, these were still higher than the reliability for the general autonomy scale score including satisfaction and frustration items.

Criterion validity

Results of partial correlation analyses are presented in Table 3. P-values for the partial correlation matrix used the Holm (1979) adjustment for multiple tests. The results indicate that only satisfaction subscales were significantly related to well-being outcomes after controlling for their respective need frustration subscales. Similarly, only frustration subscales were related to ill-being outcomes after controlling for their respective need satisfaction subscales.

Discussion

Previous findings suggested that need satisfaction and need frustration may be part of a continuum (Van den Broeck et al., 2010) or two distinguishable constructs (Cordeiro et al., 2016). The present study examines the dimensionality, reliability and criterion validity of psychological need satisfaction and frustration data from three samples. Current results indicate that need satisfaction and frustration are distinguishable constructs.

Specifically, CFA indicates that a model with six correlated factors consistently outperforms unidimensional models with a method correction or cross-loadings (i.e. ESEM). A model including method corrections among both satisfaction and frustration items measuring the same psychological need did not always converge, which limits its utility for research. This is consistent with previous findings showing convergence issues with models including several method corrections (Marsh & Bailey, 1991). A discriminant validity analysis indicates that the six separate scales measure distinguishable constructs, as the correlations within each scale are stronger than the correlations among items across scales. A reliability analysis indicates that when the satisfaction and frustration of each need are specified as distinguishable but correlated constructs, these subscale scores exhibit higher reliabilities than when they are specified as a single construct. These results were consistent in all three samples.

Table 1

Fit indices for tested models

Model (method correction)	YB χ^2	df	CFI	SRMR	RMSEA (90% CI)	BIC
Sample 1						
Three needs (positive)	276.56***	123	.929	.071	.059 (.051, .068)	20.638
Three needs (negative)	230.78***	123	.950	.062	.050 (.040, .059)	20.584
Three needs (both)ᵃ	225.75***	114	.948	.055	.053 (.043, .062)	20.626
Three needs – ESEM	397.38***	102	.863	.054	.090 (.082, .099)	20.891
Six factors	205.38***	120	.960	.048	.045 (.035, .054)	20.572
Sample 2						
Three needs (positive)	336.79***	123	.849	.140	.085 (.075, .094)	14.337
Three needs (negative)	429.88***	123	.783	.176	.101 (.092, .111)	14.441
Three needs – ESEM	176.48***	102	.947	.036	.055 (.043, .067)	14.235
Six factors	169.15**	120	.965	.046	.041 (.028, .053)	14.127
Sample 3						
Three needs (positive)	337.03***	123	.899	.067	.070 (.061, .078)	19.736
Three needs (negative)	351.88***	123	.892	.074	.072 (.064, .080)	19.747
Three needs – ESEM	479.75***	102	.822	.063	.102 (.093, .110)	20.006
Six factors	230.31***	120	.948	.042	.051 (.041, .060)	19.629

Note: YB X2 = Yuan–Bentler scaled chi square, df = degrees of freedom, CFI = Comparative Fit Index, SRMR = Standardized Root Mean Square Residual, RMSEA = Root Mean Square Error of Approximation, CI = Confidence Intervals, BIC = Bayesian Information Criterion. a The model converged to a proper solution only in sample 1

*** p < .001; ** p <.01; * p <.05

Figure 2.
Item loadings, standard errors (inside brackets) and heterotrait-
monotrait ratio (HTMT) of correlations among factors.
Note: Values for sample 1 and 2 (English) are shown, respectively, in first
and second row. Values for sample 3 (Spanish) are shown in third row

Additionally, consistent with criterion validity studies (Bartholomew et al., 2011; Longo et al., 2016), the results also show that need satisfaction and frustration exhibit different relationships to external variables, with need satisfaction more strongly related to well-being and need frustration more strongly related to ill-being. It must be acknowledged that the positive and negative affect scales exhibited reliabilities below .70. Yet, despite this limitation, satisfaction and frustration subscales exhibited the hypothesized correlation pattern with these two outcomes. In short, the above-mentioned correlation patterns further supports the discriminant validity of need satisfaction and frustration.

Table 2

Reliability analysis using the omega hierarchical (ωh)

Scale	Sample 1	Sample 2	Sample 3
Autonomy	.67	.56	.58
Autonomy Satisfaction	.80	.79	.85
Autonomy Frustration	.69	.80	.65
Relatedness	.69	.43	.73
Relatedness Satisfaction	.75	.72	.77
Relatedness Frustration	.74	.77	.79
Competence	.79	.52	.69
Competence Satisfaction	.85	.75	.81
Competence Frustration	.79	.80	.74

Note: ωh coefficients below .70 are in bold

Table 3

Partial correlations

Scale (control)	Positive affect	Negative affect	Academic engagement	Academic burnout	Intrinsic motivation
AS (AF)	0.22***	-0.09	0.33***	-0.10	0.18*
AF (AS)	-0.02	0.21**	-0.07	0.35***	-0.07
RS (RF)	0.11	0.01	0.21***	0.03	0.20**
RF (RS)	-0.10	0.22***	-0.02	0.29***	-0.04
CS (CF)	0.25***	-0.09	0.22***	-0.02	0.25***
CF (CS)	-0.08	0.27***	-0.11	0.37***	-0.04

Note: AS = Autonomy satisfaction; AF = Autonomy frustration; RS = Relatedness satisfaction; RF = Relatedness frustration; CS = Competence satisfaction; CF = Competence frustration.

*** $p < .001$; ** $p < .01$; * $p < .05$

Based on the findings we can conclude that, if basic needs scores do not fit a unidimensional model, this is likely not due to method effects, but rather due to fact that, consistent with basic psychological needs theory (Deci & Ryan, 2000), substantive differences exist between need satisfaction and need frustration. As Ekkekakis (2013) argues, not feeling sad is different from feeling happy. Similarly, it can be argued that not feeling rejected is different from feeling loved, and not feeling incompetent is different from feeling competent. The two may be negatively correlated and may occasionally fit a corrected one-factor model. However, a more conservative and possibly accurate choice would be to treat them as separate.

Despite the consistent replication across the three samples, the present study has some limitations, which suggest avenues for additional research. First, analyses were based on convenience samples. While the results were highly consistent across samples from different populations, future studies could examine whether they also replicate in new populations. For instance, the Spanish version of the NSFS could be administered to

Latin American samples and, ideally, these samples could be recruited so as to be representative of their respective populations. Second, the results of criterion validity analyses for the Spanish version of the scale are cross-sectional. Therefore, further longitudinal or experimental studies are necessary to infer causal influences on well-being and ill-being.

The findings suggest that need frustration items are not simply reverse-worded satisfaction items, but reflect a somewhat different experience of need deprivation. While a unidimensional model including a method correction may sometimes fit the data adequately (e.g. sample 1), a model specifying need satisfaction and frustration as distinguishable but correlated constructs fit the data better in all samples. Therefore, we recommend using separate scale scores for the satisfaction and frustration of each need. Additionally, the paper contributes to the current literature by presenting a Spanish version of the NSFS. Its scores exhibited adequate dimensionality, reliability and validity. Therefore, the scale should prove useful in future research involving Spanish- speaking populations.

References

Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling*, 16, 397-438. doi:10.1080/10705510903008204

Bartholomew, K., Ntoumanis, N., Ryan, R. M., & Thøgersen-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. doi:10.1123/jsep.33.1.75

Boada-Grau, J., & Merino-Tejedor, E. (2015). Adaptation and psychometric properties of the SBI-U Scale for Academic Burnout in university students. *Anales de Psicología*, 31(1), 290-297. doi:10.6018/analesps.31.1.168581

Brown, T. A. (2015). *Confirmatory factor analysis for applied research*. London: The Guilford Press.

Chemolli, E., & Gagné, M. (2014). Evidence against the continuum structure underlying motivation measures derived from self- determination theory. *Psychological Assessment*, 26(2), 575-585. doi:10.1037/a0036212

Cordeiro, P., Paixão, P., Lens, W., Lacante, M., & Sheldon, K. (2016). Factor structure and dimensionality of the balanced measure of psychological needs among Portuguese high school students: Relations to well-being and ill-being. *Learning and Individual Differences*, 47, 51-60. doi:10.1016/j.lindif.2015.12.010

Ekkekakis, P. (2013). *The measurement of affect, mood, and emotion: A guide for health-behavioral research*. Cambridge: Cambridge University Press.

Gargurevich, R. (2010). Propiedades psicométricas de la versión internacional de la Escala de Afecto Positivo y Negativo-forma corta (I-Spanas SF) en estudiantes universitarios [Psychometric properties of the international short version of the Positive and Negative Affect Schedule (I-Spanas-SF) in university students]. *Persona*, 13, 31-42.

González-Cutre, D., Sierra, A. C., Montero-Carretero, C., Cervelló, E., Esteve-Salar, J., & Alonso-Álvarez, J. (2015). Evaluación de las propiedades

psicométricas de la escala de Satisfacción de las Necesidades Psicológicas Básicas en General con adultos españoles [Evaluation of the psychometric properties of the Scale of Satisfaction of Basic Psychological needs in General with Spanish adults]. *Terapia Psicológica*, 33(2), 81-92. doi:10.4067/S0718-48082015000200003

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, 60, 549-576. doi:10.1146/annurev.psych.58.110405.085530

Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. doi:10.1007/s11747-014-0403-8

Holm, S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, 6(2), 65-70.

Longo, Y., Gunz, A., Curtis, G. J., & Farsides, T. (2016). Measuring need satisfaction and frustration in educational and work contexts: The Need Satisfaction and Frustration Scale (NSFS). *Journal of Happiness Studies*, 17, 295-317. doi:10.1007/s10902-014-9595-3

Marsh, H. W. (1996). Positive and negative global self-esteem: A substantively meaningful distinction or artifactors? *Journal of Personality and Social Psychology*, 70(4), 810-819. doi:10.1037/0022-3514.70.4.810

Marsh, H. W., & Bailey, M. (1991). Confirmatory factor analyses of multitrait-multimethod data: A comparison of alternative models. *Applied Psychological Measurement*, 15(1), 47-70. doi:10.1177/014662169101500106

Muñiz, J., Elosua, P., & Hambleton, R. K. (2013). Directrices para la traducción y adaptación de los tests: segunda edición [International Test Commission Guidelines for test translation and adaptation: Second edition]. *Psicothema*, 25(2), 151-157. doi:10.7334/psicothema2013.24

Núñez, J. L., Martín-Albo, J., & Navarro, J. G. (2005). Validación de la versión española de la Échelle de Motivation en Éducation [Validity of the Spanish version of the Échelle de Motivation en Éducation]. *Psicothema*, 17(2), 344-349.

Parra, P., & Pérez, C. (2010). Propiedades psicométricas de la escala de compromiso académico UWES-S (versión abreviada) en estudiantes de Psicología [Psychometric properties of utrech work engagement scale for students, UWES-S (short form), in psychology students]. *Revista de Educación y Ciencias de la Salud*, 7(2), 128-133.

R Core Team (2015). R: A language and environment for statistical computing [Computer software manual]. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from http://www.R-project.org

Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods*, 17(3), 354. doi:10.1037/a0029315

Revelle, W. (2015). Psych: Procedures for psychological, psychometric, and personality research [Computer software manual]. Northwestern University, Evanston, Illinois, USA. Retieved from http://cran.r-project.org/web/packages/psych/

Rosenberg, M. (1965). *Society and the adolescent self-image.* Princeton, NJ: Princeton University Press.

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, 48(2), 1-36.

Salmela-Aro, K., Kiuru, N., Leskinen, E., & Nurmi, J. E. (2009). School burnout inventory (SBI) reliability and validity. *European Journal of Psychological Assessment*, 25(1), 48-57. doi:10.1027/1015-5759.25.1.48

Schaufeli, W. B., & Bakker, A. B. (2003). *The Utrecht Work Engagement Scale (UWES). Test Manual.* Utrech: Department of Social and Organizational Psychology. Retrieved from http://www.beanmanaged.com/doc/pdf/arnoldbakker/articles/articles_arnold_bakk er_87.pdf

semTools Contributors (2016). semTools: Useful tools for structural equation modeling. R package version 0.4–12. Retrieved from http://cran.r-projec t.org/web/packages/semTools/index.html

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. doi:10.1007/s11031-012-9279-4

Sicilia, A., Ferriz, R., & Saenz-Álvarez, P. (2013). Validación española de la Escala de Frustración de las Necesidades Psicológicas (EFNP) en el ejercicio físico [Spanish validation of the Psychological Needs Thwarting Scale in exercise]. *Psychology, Society, & Education*, 5(1), 1-19.

Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *Journal of Cross-Cultural Psychology*, 38(2), 227-242. doi:10.1177/0022022106297301

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 53(4), 1003-1017. doi:10.1177/0013164492052004025

Van den Broeck, A., Vansteenkiste, M., Witte, H., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the work-related Basic Need Satisfaction scale. *Journal of Occupational and Organizational Psychology*, 83(4), 981-1002. doi:10.1348/096317909X481382

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23(3), 263-280. doi:10.1037/a0032359

Woods, C. M. (2006). Careless responding to reverse-worded items: Implications for confirmatory factor analysis. *Journal of Psychopathology and Behavioral Assessment*, 28(3), 186-191. doi:10.1007/s10862-005-9004-7

Zinbarg, R. E., Revelle, W., Yovel, I., & Li, W. (2005). Cronbach's α, Revelle's β, and McDonald's ω H: Their relations with each other and two alternative conceptualizations of reliability. *Psychometrika*, 70, 123-133. doi:10.1007/s11336-003-0974-7