RESEARCH ARTICLE

Psychometric Properties of the Psychological Needs Satisfaction Frustration Scale (BPNSFS) in Chilean University Students

Propiedades psicométricas escala satisfacción y frustración necesidades psicológicas (ESFNPB) en universitarios chilenos

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Summary

This research work aims to analyze the psychometric properties of the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) -autonomy, competence and relatedness- identified by the self-determination theory (Deci & Ryan, 2000b), in a sample of 297 university students from different faculties and programs belonging to a Chilean university. To achieve the objective, through a psychometric study by confirmatory procedures, a confirmatory factor analysis (CFA) was performed, analyzing the six-factor proposal developed by Chen et al. (2015), and the internal consistency of the scale was evaluated using the ordinal Alpha. The outcomes obtained from the sample of university students indicate a good internal consistency, Alpha = 0.90 and 0.86 for psychological needs satisfaction and frustration. Besides, the outcomes of the confirmatory factor analysis showed an adequate fit of the model (χ^2/gl = 1.75; CFI = 0.92; IFI = 0.92; TLI = 0.90; RMSEA = .05 and SRMR =.05) to the data, showing evidences of the validity of the six-factor structure proposed. According to the foregoing, it is considered that the scale to measure satisfaction and frustration of the three basic psychological needs can be used initially in university students in the higher education of Chile, thus, allowing the relationship with other variables of interest to generate explanatory models that allow going in depth the understanding of aspects that are of institutional interest.

Keywords: Psychometric properties, BPNSFS Scale, university students.

Resumen

La presente investigación tiene como propósito analizar las propiedades psicométricas de la Escala de Satisfacción y Frustración de las Necesidades Psicológicas Básicas de Autonomía, Competencia y Relación (ESFNPB) identificadas por la teoría de la autodeterminación (Deci & Ryan, 2000b), en una muestra de 297 estudiantes universitarios de distintas facultades y carreras pertenecientes a una universidad Chilena. Para lograr el objetivo,

mediante un estudio psicométrico por procedimientos confirmatorios, se realizó un análisis factorial confirmatorio (AFC), analizando la propuesta de seis factores realizada por Chen et al. (2015) y se evaluó la consistencia interna de la escala mediante el Alfa ordinal. Los resultados obtenidos con la muestra de estudiantes universitarios indican una buena consistencia interna, alfa = 0.90 y 0.86 para satisfacción y frustración de las necesidades psicológicas, así mismo los resultados del análisis factorial confirmatorio mostraron un ajuste adecuado del modelo a los datos (χ^2/gl = 1.75; CFI = 0.92; IFI = 0.92; TLI = 0.90; RMSEA = .05 y SRMR =.05), brindando evidencias de validez de la estructura de seis factores. Según lo anterior se considera que la escala para medir satisfacción y frustración de las tres necesidades psicológicas básicas puede ser utilizada preliminarmente en estudiantes universitarios en el contexto de la educación superior chilena, permitiendo también la relación con otras variables de interés para generar modelos explicativos que permitan profundizar la comprensión de aspectos que son de interés institucional.

Palabras clave: Propiedades psicométricas, Escala ESFNPB, estudiantes universitarios

Introduction

The transition from high school to university is determined by a series of drivers that interact and influence the learning, academic performance and permanence or abandonment of university studies. It is related to the educational process quality and to clear impacts on psychological and socioeconomic aspects in students (Fernández-Hileman, Corengia & Durand, 2014; Garbanzo, 2012).

The abandonment of higher education studies is a matter of concern for institutions, which is due to social, family, funding source pressures and due to its impact on the weakening of the advanced human capital of the countries. In the case of Chile, this phenomenon has awaken a general interest, since it is considered that at least half of the students who enter higher education institutions, drop out the studies before completing their professional training and obtaining a professional degree (Abello et al., 2012; Donoso & Schiefelbein, 2007).

Theoretical and empirical contributions to determine the causes that influence the academic performance and the permanence or abandonment of higher education studies have increased in the last period, taking into account personal, social factors (Barahona, 2014), as well as educational drivers, such as study habits (Chilca, 2017), sociocultural and economic factors (Catalán & Santelices, 2014; Garcés & Arriagada, 2015). The studies of the factors involved in the learning process highlight the importance gained of the cognitive-motivational variables as academic success or failure mediators. (Miñano & Castejón, 2011)

The specialized literature has shown a lot of evidences of the importance of the academic motivation in the learning process of students and the high relationship with self-regulated learning and the academic self-concept (Carranza & Apaza, 2015). In general, it is assumed that motivation refers to those internal factors that energize, motivate and guide the student to perform a series of activities proposed in the learning process, acting as a mediator

in the acquisition of curricular contents, persistency, behavior purpose and academic performance (Stover, Uriel, De la Iglesia, Freiber & Liporace, 2014; Valenzuela, Muñoz, Silva-Peña, Gómez & Precht, 2015).

One of the current theories of motivation is the self-determination theory (STD; Deci & Ryan, 2000b) that overcomes the exclusive approach to the academic goal or achievement, assuming motivation as the result of internal trends of the person that stimulate to behave in the absence of external rewards. It is based on the idea of the human being as a causal and growth-oriented agent, with a natural inclination towards the integration of its psychic elements and towards its integration in increasingly wider and complex social structures (Ryan & Deci, 2000b).

This theory recognizes that motivation has a multidimensional nature with different levels located in a continuum, developing a descriptive function, from the highest levels of self-determination and therefore, with a high intrinsic motivation, to the lowest level of motivation, called lack of motivation. There are several types of extrinsic motivation according to the level of self-determination people have, external, introjected, identified and integrated. Therefore, as the externally regulated motivation is oriented towards integrated regulation, behaviors become less independent of external controls and therefore, more self-determined (Faye & Sharpe, 2008; Moreno, Silveira & Alias, 2015).

The STD proposes the existence of three basic psychological needs: need for autonomy, competence and relatedness that influence the intrinsic motivation of individuals and that make them act in a certain way (Doménech & Gómez, 2011; Ryan & Deci, 2000a). The autonomy refers to the fact that the person feels that is the reason for the behavior, it does not mean independence but internal acceptance and commitment with the motivated behavior. The competence occurs when the person feels effective with their behavior, interacts effectively with the environment, experiencing the opportunity to express or develop their abilities. Finally, the need for relatedness occur when a person feels connected with or understood by

others, they are related to authenticity with other significant groups and experience a sense of belonging; needs that have been identified as basic in the optimal psychological development and general well-being. (Deci & Ryan, 2000b; Tian, Chen & Huebner, 2014)

These three psychological needs considered in organismic and functional terms are innate and essential nutrients for psychological growth, integration and well-being, playing an important role in the psychological health of the individuals and their satisfaction is associated with a more effective level of functioning (Deci & Ryan, 2000b). It has been recognized that certain environmental factors influence and affect the satisfaction of needs, causing self-determined behaviors, or obstructing their satisfaction, causing non-self-determined behaviors (Faye & Sharpe, 2008).

To measure these psychological needs, Deci and Ryan (2000a) proposed the instrument called Basic Psychological Needs Scale (BPNS) that evaluates the satisfaction of these needs in general and in specific fields. It was adapted to and used in different countries and contexts. Subsequently, scales was developed to measure the satisfaction of these needs in different cultural environments and contexts; in the physical and sport exercise, in physical education classes and in higher education (León, Domínguez, Núñez, Pérez & Martín-Albo, 2011; Vlachopoulos & Michailidou, 2006; Wilson, Rogers, Rodgers & Wild, 2006).

Recently, Chen et al. (2015) prepared the instrument called Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) in English, and it was validated in four different cultures and languages: China, Belgium, United States of America and Peru. The authors of the original study have provided evidences showing that the scale composed of 24 items has a multidimensional structure of six factors that measure satisfaction and frustration, respectively, of each one the psychological needs. To conduct the analysis, a sample of 1051 university students aged 20 on average was used. The outcomes obtained from the cross-validation recognized four items per need, with an internal consistency for each dimension varying between

0.64 and 0.89. The six-factor model proposed by the authors had a good fit, SBS-χ^2 (231) = 441.99, CFI = 0.95, RMSEA = .04 and SRMR = .04. (Chen et al., 2015).

Subsequently, Cordeiro, Paixão, Lens, Lacante and Luyckx (2016) translated the BPNSFS into Portuguese, analyzing the construct validation with Portuguese undergraduate students. To evaluate the psychometric properties of the scale, a sample of 417 university students from different programs and aged 20 on average was used. The outcomes obtained showed a good internal consistency of the scale and they varied between .70 for autonomy frustration and 0.85 for competence satisfaction. Besides, the confirmatory factor analysis performed showed good fit indices, χ^2 (237) = 519.128, CFI = 0.95, RMSEA = .05 and SRMR = .05. Outcomes supporting the data of the original six-factor model (Cordeiro et al., 2016).

In our context, there is an interest generalized by the study of academic motivation and psychological needs of university students. However, and according to the review, there was only background information of the cross-validation of the scale developed by Chen et al. (2015), and it included university students from Lima, obtaining for this group values of adequate internal consistency for six subscales; α = 0.74 (autonomy satisfaction), α = 0.75 (relatedness satisfaction) and α = 0.78 (competence satisfaction), as well as α = 0.77 (autonomy frustration), α = 0.64 (relatedness frustration) and α = .67 (competence frustration). According to the foregoing, it is important to study how the scale works in the context of the Chilean higher education.

Taking into account the foregoing, this study aims to analyze the psychometric properties through the classical analysis of the items, confirmatory factor analysis and the internal consistency of the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS), in a sample of Chilean university students from different faculties and programs, contributing with evidences of its multidimensional structure to be used in higher education studies.

Method

Design and Participants

A quantitative study with an instrumental design was used to evaluate the psychometric properties of the scale that measures satisfaction and frustration of basic psychological needs (Ato, López & Benavente, 2013). The type of sampling used was a non-probabilistic accidental sampling.

To conduct the study, a sample composed of 297 university students of first and second year in the Universidad de Antofagasta, aged between 18 and 40 (M= 20.6, DE = 2.29) was used, 194 of them were women and 103 men, accounting for 65.3% and 34.7%, respectively. Voluntary participants in the study belong to four different faculties: Social Sciences, Arts and Humanity, Education, Engineering and Medicine and Odontology.

Instrument

The original instrument, Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) was validated in four different cultures and languages (Chen et al., 2015), the Spanish version of the scale was adapted and validated with Peruvian university students, specifically from Lima, using the linguistic translation conducted by experts in the self-determination theory.

The scale is composed of 24 items grouped in six factors measuring satisfaction and frustration of each one the basic psychological needs, proposed by the self-determination theory; satisfaction/frustration of the need for autonomy, competence and relatedness. For the autonomy dimension, 8 items measure feelings with respect to the possibility to freely choose and assume the choice (for example: "I feel I have the freedom and possibility to choose things I assume"). For the competence dimension, 8 items evaluate the ability to develop activities and achieve goals with success (for example: "I feel I can do things right"). The relatedness dimension is composed of 8

items measuring the relationship with others and the sense of belonging (for example: "I feel that people, who matter to me, care about me"). For each case, 4 items measure satisfaction of needs and 4 items measure frustration of needs. The 24 items are evaluated through a Likert-type 5-point response scale, from 1 (completely false) to 5 (completely true).

Specifically, the Spanish version that was used in this study was authorized to use it in Chilean university students by the Peruvian researcher who was part of the research team that developed this version of the test, collecting evidences of validity and reliability in four samples of different countries. (Chen et al., 2015)

Procedure

The Spanish version of the scale was managed as a pilot by a group of 8 university students of different levels to verify if each item was understood. The outcomes of the use of this pilot did not show any comprehension problem.

The final management of the scale was conducted in offices of the Universidad de Antofagasta, Chile. First and before the application of the instrument, the Directors of Studies and/or Directors of Department were contacted to ask them for their collaboration and explain them the objectives of the research. Once the authorization was obtained, time and date for the application of the instrument were coordinated. The voluntary and anonymous participation of the students was asked and they were given an informed consent letter, which is a document that explained the objectives of the study, the length of it, instructions to answer the instrument and protection of confidentiality of the information provided as well as the outcomes obtained. Such application was given to everyone in the same classroom at the end of the second semester of the 2016 academic period. The ethic aspects of the research are based on three basic premises: respect to people (principle of autonomy), the pursuit of good (principles of beneficence

and not maleficence) and the principle of justice. These principles, which are declared universal in the field of scientific research, become operative through the informed consent signed, determining the risks and benefits for the participants in the study (Agar, 2004; Mondragón, 2007).

Data Analysis

In order to check the factorial structure of the scale in a sample of Chilean university students, evidences of validity were collected by using the statistic package SPSS V.23 and the AMOS V. 23 program. To analyze the factorial validity of the instrument, a confirmatory factor analysis (CFA) was used through the maximum likelihood method, according to the original model and structure of the scale. The analysis of data normality was carried out by analyzing univariate data of asymmetry and kurtosis. The CAF conducted allowed analyzing and verifying if the theoretical model proposed fits the data used (Roth, 2012) to support the validity of the six-factor model proposed that measures the satisfaction and frustration of the basic psychological needs of autonomy, competence and relatedness developed by Chen et al. (2015). The fit of the model was verified through different goodness to fit indices (Boomsma, 2000) in order to fulfill the purposes and the research analyses. Goodness to fit indices were used when the ratio between the chi-squared value and the degree of freedom was lower than 3, χ^2/degrees of freedom (χ^2/gl) (Kline, 2005), comparative fit index (CFI), value of which must be equal to or higher than 0.90, incremental fit index (IFI) that indicates improvements in the model fit per degrees of freedom and that must be equal to or higher than 0.90, Tucker-Lewis index (TLI) that must be equal to or higher than 0.90 (Hair, Black, Babin, Anderson & Tatham, 2006; Shumacker & Lomax, 1996). The root mean square error of approximation (RMSEA) was also included as a goodness of fit index and it must be lower than .06 or assumes a maximum value of .08 and the Standardized Root Mean Square Residual (SRMR) that must be equal or lower than .08 (Byrne, 2009; Hu & Bentler, 1999). Internal consistency was evaluated through ordinal alpha, which has

shown more level of accuracy for ordinal and dichotomous response scales (Elosua & Zumbo, 2008), through the program Microsoft Office Excel.

Outcomes

Preliminary Descriptive Analyses

To conduct descriptive analyses, asymmetry and kurtosis were calculated under the assumption of a normal data distribution. As shown in Table 1, all univariate asymmetry values are equal to or lower than value 2, varying between .097 (item 2) and -2.03 (item 17), while kurtosis values, which must be equal to or lower than 7, varied between -.050 (item 13) y 5.11 (item 17), thus, meeting with the univariate normality criterion (Curran, West y Finch, 1996). In addition, the basic psychological needs satisfaction and frustration scale (BPNSFS) shows means between 4.59 (item 17) and 1.59 (item 4), standard deviations between 1.30 (item 24) and .740 (item 17).

Table 1.

Descriptive statistics of the data in the sample of university students.

	Item	*M*	*SD*	Asymmetry	Kurtosis
1	I feel I have the freedom and possibility to choose things I assume.	4.16	.976	-1.05	.654
2	(*)	3.04	1.06	.097	-.504
3	I feel that people, who matter to me, care about me.	4.25	.962	-1.23	1.01
4	(*)	1.59	1.06	1.86	2.58
5	I feel I can do things rights.	4.43	.816	-1.62	2.88
6	(*)	2.19	1.18	.680	-.609
7	(*)	3.98	.993	-.626	-.433
8	(*)	2.03	1.14	1.03	.305
9	(*)	4.32	.932	-1.41	1.67
10	(*)	1.77	1.11	1.35	.837
11	(*)	4.40	.756	-1.23	1.24
12	(*)	2.46	1.20	.613	-.484
13	(*)	4.08	.946	-.772	-.050
14	(*)	2.61	1.29	.345	-.996
15	(*)	4.32	.791	-.891	-.063
16	(*)	1.79	1.10	1.37	.978
17	(*)	4.59	.740	-2.13	5.11
18	(*)	2.31	1.27	.634	-.747
19	(*)	4.18	.964	-1.11	.781
20	(*)	2.54	1.19	.477	-.675
21	(*)	4.36	.871	-1.51	2.30
22	(*)	1.85	1.04	1.09	.440
23	(*)	4.14	.852	-.876	.571
24	(*)	2.14	1.30	.932	-.289

Note: (*) The content of the item has been omitted to safeguard the copyright, as suggested by the creators of the original instrument.

According to the outcomes obtained from the factorial load matrix of the BPNSFS items, the dimensions of the original scale are confirmed satisfactorily. As shown in Table 2, total items account for 55% of the total variance. Values of standardized factorial saturations are adequate and significant and vary from .43 (item 8) and .82 (item 19), corroborating the six-factor structure proposed by Chen et al. (2015). When analyzing the correlation between the six factors in Table 3, it is observed that there is a positive and significant correlation between factors measuring satisfaction of psychological needs of autonomy, relatedness and competence; similar situation to the correlation between factors measuring frustration of these three psychological needs, and as expected, a negative and significant correlation between factors measuring satisfaction and frustration, respectively.

Table 2.

Matrix of factorial loads of the items of the scale.

Items		Autonomy		Relatedness		Competence	
		SAT	FRUS	SAT	FRUS	SAT	FRUS
1	I feel I have the freedom and possibility to choose things I assume.	.61					
2	(*)	.67					
3	(*)	.75					
4	(*)	.46					
5	(*)		.56				
6	(*)		.71				
7	(*)		.59				
8	(*)		.43				
9	I feel that people, who matter to me, care about me.			.49			
10	(*)			.80			
11	(*)			.67			
12	(*)			.62			
13	(*)				.62		
14	(*)				.64		
15	(*)				.65		
16	(*)				.49		
17	I feel I can do things right.					.63	
18	(*)					.73	
19	(*)					.82	
20	(*)					.65	
21	(*)						.64
22	(*)						.64
23	(*)						.57
24	(*)						.60
Variance per factor		8.01	10.96	6.90	9.74	6.26	13.11
Total variance explained		**54.98**					

Note: (*) The content of the item has been omitted to safeguard the copyright, as suggested by the creators of the original instrument.

Table 3.

Matrix of correlations between factors of the scale.

	1	2	3	4	5	6
1 Autonomy Satisfaction		.461**	.530**	-.425**	-.414**	-.417**
2 Relatedness Satisfaction	.461**		.460**	-.285**	-.613**	-.307**
3 Competence Satisfaction	.530**	.460**		-.379**	-.382**	-.532**
4 Autonomy Frustration	-.425**	-.285**	-.379**		.411**	.508**
5 Relatedness Frustration	-.414**	-.613**	-.382**	.411**		.460**
6 Competence Frustration	-.417**	-.307**	-.532**	.508**	.460**	

Note. ** *The correlation is significant with p< .01*

Confirmatory Factor Analysis

The preliminary confirmatory factor analysis of the basic psychological needs satisfaction and frustration scale showed an adequate fit of the data to the model, with a ratio $\chi^2/gl = 1.75$; a CFI = 0.92; an IFI = 0.92; a TLI = 0.90; a RMSEA of .05 (IC: .042 - .058) and a SRMR of .05. The previous outcomes support the validity of the six-factor model proposed for the data used.

Regarding the internal consistency of the factors, taking into account the ordinal alpha shown in Table 4, the outcomes show, for the psychological needs satisfaction dimension, an alpha = 0.90 and for the need frustration dimension an alpha = 0.86. Values obtained from the 6 subscales was an alpha =0.71 (autonomy satisfaction), an alpha = 0.73 (relatedness

satisfaction) as well as an alpha = 0.79 (competence satisfaction), an alpha = .65 (competence frustration), an alpha = 0.69 (relatedness frustration) and finally, an alpha = 0.70 (competence frustration), data similar to those found in the cross-validation process of the original scale in four countries, specifically if internal consistency found in Peruvian university students is observed (Chen et al., 2015).

Table 4.

Factorial load and ordinal alpha by subscale and dimension.

	Item	Factorial load	Alpha
	Autonomy Satisfaction		**.71**
1	I feel that I have the freedom and the possibility to choose things I assume.	.61	
2	(*)	.67	
3	(*)	.75	
4	(*)	.46	
	Autonomy Frustration		**.65**
5	I feel that most of the things I do, I do them because "I have to."	.56	
6	(*)	.71	
7		.59	
8	(*)	.43	
	(*)		
	Relatedness Satisfaction		**.73**
9	I feel that people, who matter to me, care about me.	.49	
10	(*)	.80	
11	(*)	.67	
12	(*)	.62	
	Relatedness Frustration		**.69**
13	I feel excluded from the group I want to belong to.	.62	
14	(*)	.64	
15	(*)	.65	
16	(*)	.49	
	Competence Satisfaction		**.79**
17	I feel I can do things right. (*)	.63	
18	(*)	.73	
19	(*)	.82	
20		.65	

	Competence Frustration		**.70**
21	I have serious doubts about if I can do things right.	.64	
22	(*)	.64	
23	(*)	.57	
24	(*)	.60	
	Satisfaction of psychological needs		**.90**
	Frustration of psychological needs		**.86**

Note: (*) The content of the item has been omitted to safeguard the copyright, as suggested by the creators of the original instrument.

Discussion

In the last years, in the framework of the STD and in the academic field, it has been recognized that different types of personal, social, institutional and contextual variables can promote or obstruct intrinsic motivation of students, and therefore, satisfy or frustrate the basic psychological needs of autonomy, competence and relatedness, with direct consequences in the learning self-concept, learning self-regulation, motivational regulation, academic satisfaction and academic performance (Jeno & Diseth, 2014; Méndez-Giménez, Fernández-Rio & Cecchini, 2013; Moreno, Silveira & Alias, 2015; Ümmet, 2015).

The purpose of the study was to analyze psychometric properties through a confirmatory factor analysis of the Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) identified by the self-determination theory (Deci & Ryan, 2000b), for the context of higher education in a sample of university students from different faculties and programs belonging to a Chilean university.

The confirmatory factor analysis performed allows the support of the six-factor structure of the scale, which coincides with the outcomes obtained in the original proposal of the instrument made with university students aged between 16 and 32 in four different countries and the recent validation of the scale made with university students from different higher education

institutions from Portugal aged between 18 and 37 (Chen et al., 2015; Cordeiro et al., 2016).

The BPNSFS validation made with Chilean university students obtained acceptable internal consistency values, an ordinal alpha= .90 and .86 for the dimension of satisfaction of needs and frustration of needs, respectively. For six subscales, the ordinal alpha varies between .65 and .79, data that are similar to those found in the cross-validation process of the original scale, in particular if the internal consistency found in Peruvian university students is observed (Chen et al., 2015); outcomes that also support the distinction made by the scale to measure satisfaction and frustration of psychological need separately. The 24 items of the scale showed adequate psychometric properties and the values of standardized factorial saturations were significant. Besides, the total items account for 55% of the total variance. In addition, outcomes showed that there is a negative and significant correlation between factors measuring satisfaction and frustration of psychological needs, corroborating the six-factor structure proposed by Chen et al. (2015).

According to the foregoing, the preliminary outcomes showed a suitable fit of the model to the data, supporting the validity of the proposed model of 6 factors that measures the satisfaction and frustration of basic psychological needs of autonomy, competence and relatedness in the education field, initially supporting the use of university students in the context of the Chilean higher education. (Moreno, Silveira & Alias, 2015)

In the framework of STD, it is recognized that motivation is multidimensional with different levels located in a continuum, from the highest level of self-determination and therefore, with high intrinsic motivation, to the lowest level of it called lack of motivation (Moreno, Silveira & Alias), being influenced by the satisfaction or frustration of the basic psychological needs, playing an important role in the psychological health of students in the academic performance and in the decision to stay or abandon the university studies.

In the field of higher education, several personal, social, institutional and contextual variables can support or frustrate the satisfaction of basic psychological needs. Therefore, it is important on a practical level to have an instrument with suitable psychometric properties measuring these needs in order to identify several areas of intervention in the institution and in the individual, to improve the academic integration process and the permanence in the university context.

Limitations of the research work are related to the type of sample used. Although students assigned to different programs and faculties participated, all of them belong to a same university. Therefore, it can be stated that it is a very homogenous sample. Future research works that support the validity and reliability of the scale must increase the sample with other students and institutions to reduce probable biases. Another limitation of the study is the fact that it is a cross-sectional study and there is lack of support that shows convergent and/or divergent validity with other scales.

However, the outcomes obtained from the study provide preliminary background information for the use of the BPNSFS with Chilean university students. It is a contribution in the research field in tertiary education in relation to psychological needs and serves as a basis for future research works to perform other analyses to explore the factorial structure proposed and the relationship that may exist with other variables that influence the permanence or abandonment in higher education.

References

Abello, R., Díaz, A., Pérez, M. V., Almeida, L. S., Lagos, I., González, J., & Strickland, B. (2012). Vivencias e implicación académica en estudiantes universitarios: adaptación y validación de escalas para su evaluación. *Estudios pedagógicos, 38*(2), 7-19. Doi: http://dx.doi.org/10.4067/S0718-07052012000200001

Agar, L. (2004). La ética de la investigación en ciencias sociales en el contexto de la globalización: de la investigación cuantitativa a la cualitativa. *Acta bioethica*, *10*(1), 65-68. Doi: http://dx.doi.org/10.4067/S1726-569X2004000100008

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. Doi: http://dx.doi.org/10.6018/analesps.29.3.178511

Barahona, P. (2014). Factores determinantes del rendimiento académico de los estudiantes de la Universidad de Atacama. *Estudios pedagógicos, 40*(1), 25-39. DOI: http://dx.doi.org/10.4067/S0718-07052014000100002

Boomsma, A. (2000). Reporting analyses of covariance structures. *Structural Equation Modelling: A Multidisciplinary Journal*, *7*(3), 461–483. Doi: http://dx.doi.org/10.1207/S15328007SEM0703_6

Byrne, B. (2009). *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Mahwah, NJ: Lawrence Erlbaum Associates. Doi: https://doi.org/10.4324/9780203805534

Carranza, R., & Apaza, E. (2015). Autoconcepto académico y motivación académica en jóvenes talento de una universidad privada de Tarapoto. *Propósitos y Representaciones, 3*(1), 233-263. Doi: http://dx.doi.org/10.20511/pyr2015.v3n1.72

Catalán, X., & Santelices, M. V. (2014). Rendimiento académico de estudiantes de distinto nivel socioeconómico en universidades: el caso de la Pontificia Universidad Católica de Chile. *Calidad en la educación*, (40), 21-52. Doi: http://dx.doi.org/10.4067/S0718-45652014000100002

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. Doi: http://doi.org/10.5334/pb.252

Curran, P. J., West, S. G. & Finch, J. F. (1996). The Robustness of Test Statistics to Nonnormality and Specification Error in Confirmatory Factor Analysis. *Psychological Methods, 1*(1), 16-29. Doi: http://psycnet.apa.org/doi/10.1037/1082-989X.1.1.16

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., 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. Doi: https://doi.org/10.1007/s11031-014-9450-1

Chilca, L. (2017). Autoestima, hábitos de estudio y rendimiento académico en estudiantes universitarios. *Propósitos y Representaciones*, *5*(1), 71-127. Doi: http://dx.doi.org/10.20511/pyr2017.v5n1.145

Deci, E. L. & Ryan, R. M. (2000a). Questionnaires: Basic Psychological Needs Scales. Recuperado de: http://www.psych.rochester.edu/SDT/measures/needs.html

Deci, E. L., & Ryan, R. M. (2000b). The ''What'' and ''Why'' of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry, 11,* 227–268. http://dx.doi.org/10.1207/S15327965PLI1104_01

Doménech, F. B., & Gómez, A. A. (2011). Relación entre las necesidades psicológicas del estudiante, los enfoques de aprendizaje, las estrategias de evitación y el rendimiento. *Electronic Journal of Research in Educational Psychology*, *9*(24), 463-496. Recuperado de: http://www.investigacion-   psicopedagogica.org/revista/new/ContadorArticulo.php?597

Donoso, S., & E. Schiefelbein, (2007) Análisis de los modelos explicativos de retención de estudiantes en la universidad: una visión desde la desigualdad social. *Estudios pedagógicos,* 33(1), pp. 7, 27. https://doi.org/10.4067/s0718-07052007000100001

Elosua, P & Zumbo, B. (2008). Coeficientes de fiabilidad para escalas de respuesta categórica ordenada. *Psicothema*, *20*(4), 896-901. Recuperado de: http://www.psicothema.com/psicothema.asp?id=3572

Faye, C., & Sharpe, D. (2008). Academic Motivation in University: The Role of Basic Psychological Needs and Identity Formation. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, *40*(4), 189. Doi: http://psycnet.apa.org/doi/10.1037/a0012858

Fernández-Hileman, M. R., Corengia, Á. & Durand, D. (2014). Deserción y retención universitaria: una discusión bibliográfica. *Pensando Psicología*, *10*(17), 85-96. Doi: https://doi.org/10.16925/pe.v10i17.787

Garbanzo, M. V. (2012). Factores asociados al rendimiento académico en estudiantes universitarios, una reflexión desde la calidad de la educación superior pública. *Revista Educación*, *31*(1), 43-63. Recuperado de: http://www.redalyc.org/articulo.oa?id=44031103

Garcés, C. R., & Arriagada, C. G. (2015). Capacidad predictiva de las notas en enseñanza media sobre el rendimiento en pruebas de selección universitaria: el caso chileno. *Aula Abierta*, *43*(2), 61-68. Doi: https://doi.org/10.1016/j.aula.2015.03.002

Hair, J. F., Black, W. C., Babin, B., Anderson, R. E. & Tatham, R. L. (2006). *Multivariate Data Analysis* (6ª ed.). Upper Saddle River, NJ: Prentice-Hall.

Hu, L., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling, 6*, 1-55. Doi: http://dx.doi.org/10.1080/10705519909540118

Jeno, L. M., & Diseth, Å. (2014). A Self-determination Theory Perspective on Autonomy Support, Autonomous Self-regulation, and Perceived School Performance. *Reflecting Education*, *9*(1), 1-20. Recuperado de: http://www.reflectingeducation.net/index.php/reflecting/article/view/121/125

Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling* (2.a. ed.). New York, NY: The Guilford Press. Doi: https://doi.org/10.1177/1049731509336986

León, J., Domínguez, E., Núñez, J. L., Pérez, A., & Martín-Albo, J. (2011). Traducción y validación de la versión española de la Échelle de Satisfacción des Besoins Psychologiques en el contexto educativo.

Anales de psicología, 27(2), 405-411. Recuperado de: http://www.redalyc.org/articulo.oa?id=16720051017

Méndez-Giménez, A., Fernández-Río, J., & Cecchini Estrada, J. A. (2013). Papel importante del alumnado, necesidades psicológicas básicas, regulaciones motivacionales y autoconcepto físico en educación física. Cuadernos de Psicología del Deporte, 13(1), 71-82. Doi: https://doi.org/10.4321/s1578-84232013000100008

Moreno J., Silveira Y., & Alias, A. (2015). Modelo predictivo para la mejora de la percepción de competencia y rendimiento académico en estudiantes universitarios. REDU: Revista de Docencia Universitaria, 13(2), 9. Doi: https://doi.org/10.4995/redu.2015.5443

Miñano, P., & Castejón, J. L. (2011). Variables cognitivas y motivacionales en el rendimiento académico en Lengua y Matemáticas: un modelo estructural. Journal of Psychodidactics, 16(2). Doi: https://doi.org/10.5944/educxx1.19052

Mondragón, L. (2007). Ética de la investigación psicosocial. Salud Mental, 30(6), 25. Recuperado de: http://www.redalyc.org/pdf/582/58230604.pdf

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemporary educational psychology, 25(1), 54-67. Doi: http://dx.doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2000b). La Teoría de la Autodeterminación y la Facilitación de la Motivación Intrínseca, el Desarrollo Social, y el Bienestar. American Psychologist, 55(1), 68-78. Doi: http://doi.10.1037110003-066X.55.1.68

Roth, E. (2012). Análisis multivariado en la investigación psicológica: Modelado predictivo y causal con SPSS y AMOS. La Paz, Bolivia: UCB/SOIPA.

Shumacker, R., & Lomax, R. (1996). A Beginner's Guide to Structural Equation Modeling. Mahwah, USA: Erlbaum.

Stover, J. B., Uriel, F., De la Iglesia, G., Hoffman, A. F., & Liporace, M. F. (2014). Rendimiento académico, estrategias de aprendizaje y motivación en alumnos de Escuela Media de Buenos Aires. Perspectivas

en Psicología, *11*(2), 10-20. Recuperado de: http://www.redalyc.org/articulo.oa?id=483547666002

Tian, L., Chen, H., & Huebner, E. S. (2014). The Longitudinal Relationships Between Basic Psychological Needs Satisfaction at School and School-related Subjective Well-being in Adolescents. *Social Indicators Research*, *119*(1), 353-372. Doi: https://doi.org/10.1007/s11205-013-0495-4

Ümmet, D. (2015). Self Esteem among College Students: A Study of Satisfaction of Basic Psychological Needs and Some Variables. *Procedia-Social and Behavioral Sciences*, *174*, 1623-1629. Doi: https://doi.org/10.1016/j.sbspro.2015.01.813

Valenzuela, J., Muñoz, C., Silva-Peña, I., Gómez, V., & Precht, A. (2015). Motivación escolar: Claves para la formación motivacional de futuros docentes. *Estudios pedagógicos, 41*(1), 351-361. Doi: https://doi.org/10.4067/s0718-07052015000100021

Vlachopoulos, S. P. y Michailidou, S. (2006). Development and Initial Validation of a Measure of Autonomy, Competence, and Relatedness in Exercise: The Basic Psychological Needs in Exercise Scale. *Measurement in Physical Education and Exercise Science, 103*, 179-201. Doi: http://dx.doi.org/10.1207/s15327841mpee1003_4

Wilson, P. M., Rogers, W. T., Rodgers, W. M. y Wild, C. (2006). The Psychological Need Satisfaction Excercise Scale. *Journal of Sport & Excercise Psychology, 28*(3)*,* 231-251. Doi: https://doi.org/10.1123/jsep.28.3.231