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Psychometric Properties and Validity of a Brief Scale Measuring Basic Psychological Needs Satisfaction in Adolescents

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PROPRIETÀ PSICOMETRICHE E VALIDITÀ
DI UNA SCALA BREVE CHE MISURA LA SODDISFAZIONE
DEI BISOGNI PSICOLOGICI DI BASE NEGLI ADOLESCENTI

ABSTRACT

Studies have shown that the satisfaction of basic psychological needs, as defined by Self-Determination Theory, has a great impact on adolescents' well-being, prosocial behavior and academic success. In the present study, we aim to validate a brief scale for adolescents measuring the satisfaction of the three basic needs for autonomy, competence, and relatedness. A preliminary qualitative study was conducted to select and adapt for adolescents a subset of 12 items from the original version of the Basic Psychological Needs Satisfaction Scale (BPNS). This version of the scale was then analyzed in terms of dimensionality, measurement invariance and criterion validity on a sample of 308 Italian adolescents (M age = 14.04 years; 57.1% males). The results of confirmatory factor analyses supported the posited three-factors structure and the measurement invariance of the instru-

ment across gender. Correlations with a measure of psychological well-being provided evidence for criterion validity. The scale proved to be a valid and reliable instrument to measure the levels of satisfaction of the psychological need for autonomy, competence and relatedness in adolescents.

Keywords: Adolescents; Basic psychological needs; Measurement invariance; Scale; Validation.

1. INTRODUCTION

Self-Determination Theory specifies the existence of three basic psychological needs: autonomy, competence, and relatedness (Deci & Ryan, 2000). Autonomy refers to the need of an individual to be the source of his/her own behaviour. Competence reflects the need to feel adequate at achieving goals. Relatedness involves the necessity to feel connected with significant others. A substantial amount of research shows that individual's satisfaction of these fundamental, universal psychological needs is associated with high levels of psychological well-being (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013).

During adolescence, the satisfaction of needs for autonomy, competence and relatedness may become an increasingly significant factor for psychological well-being (Leveresen *et al.*, 2012). In fact, adolescents can experience a higher desire to make their own decisions and a greater demand for complicated task (Eccles *et al.*, 1993; Girelli, Alivernini, Lucidi *et al.*, 2018). Moreover, since this age is characterized by a decrease in compliance and conformity with their parents, their need to be related and connected with peers and others significant adults may have an increase (Leveresen *et al.*, 2012; Mikami *et al.*, 2017; Alivernini, Cavicchiolo, Girelli *et al.*, 2019).

Needs fulfilment has been examined by a large body of research, however the attention to how it is measured is more recent. A measure of basic needs satisfaction at a general level was developed by Ryan and Deci (2000) and Gagnè (2003): the Basic Needs Satisfaction in General Scale (BNSG-S), also known as the Basic Psychological Need Satisfaction Scale (BPNS or BNS). The scale was largely used in general contexts (i.e. Gagnè, 2003; Thøgersen-Ntoumani & Ntoumanis, 2007; Niemiec & Ryan, 2009), but few studies have analysed its psychometric properties. The results of the study conducted by Johnston and Finney (2010) showed

a satisfactory three-factor solution for the scale and provided evidence for the external validity of the measure. Internal consistency, test-retest reliability, and content validity of a Farsi version of the scale in Iranian samples were found satisfactory (Tajrishi *et al.*, 2011). In a study exploring the factorial validity of three language versions of the BPNS in a South African sample (Schutte, Wissing, & Ellis, 2018), the fit of the three-factors model of the scale was found to be good for the Afrikaans version, acceptable for the English version, and poor for the Setswana version. The reliability of the BPNS has also been documented in Italy (Laghi *et al.*, 2009), however there is no study examining the dimensionality of this scale in an Italian sample. Moreover, despite the widespread use of the scale for measuring the satisfaction of psychological needs at a general level and on individuals of different age groups, no study has implemented a measure that was specific for adolescents. In fact, most of the research conducted hitherto in this field have used instruments that have been developed for adults (Gagnè, 2003). This is an important issue as adult-constructed measures may not reflect the meanings that are most salient to adolescents (Damon & Hart, 1988).

Taking the above-mentioned issues into account, starting from the original scale – the BPNS – we first conducted a preliminary qualitative study in order to measure the content validity of the items specifically adapted for adolescents, and in order to select the best items for the brief version. Then, we investigated the dimensionality, measurement invariance across gender and criterion validity of the brief scale in a sample of adolescents. In the next sections we will describe the validation study of the brief scale, whereas the procedure of the preliminary qualitative study will be reported shortly in the measures section.

2. PARTICIPANTS AND PROCEDURE

The sample consisted of 308 adolescents (M age = 14.04 years; SD = 2.70; 57.1% males) who were recruited on a voluntary basis from 9 youth centres in Italy. Participation was obtained through an informed consent procedure requiring consent from participants > 18 y.o. and from participants' parents for participants < 18 y.o. The questionnaire took approximately 10 minutes to be completed and the participants' responses were anonymous and confidential.

3. MEASURES

The brief scale measuring the satisfaction of basic psychological needs in adolescents was developed starting from the original version of the BPNS, which is composed of 20 items. Firstly, the BPNS original items were translated from English into Italian by two English Italian bilinguals using standardized back translation procedures (Hambleton & Patsula, 1998). Secondly, the BPNS scale was administered to a small sample of adolescents (N = 19) using the think-aloud technique. Participants' comments about each item were collected and analyzed by three expert raters who evaluated the clarity of each item. For each dimension (Autonomy, Competence and Relatedness), the four items that obtained the highest ratings in terms of clarity were selected and adapted according to the adolescents' comments.

Therefore, the final version of the brief scale measuring the satisfaction of basic psychological needs in adolescents was composed of 12 items, and three subscales (Autonomy, Competence and Relatedness; Appendix 1 – English version; Appendix 2 – Italian version). Adolescents were asked to evaluate the extent to which each statement (e.g., «I feel like I can pretty much be myself») was true for them using a 5-point Likert-type scale ranging from *not true at all* (1) to *very true* (5).

3.1. *Psychological well-being*

Psychological well-being was measured by using a 12-item version of the Positive and Negative Affect Schedule – PANAS (Crawford & Henry, 2004). The items selection was based on a previous study conducted on a sample of adolescents (Alivernini, Cavicchiolo, Girelli *et al.*, 2019; Alivernini, Cavicchiolo, Manganelli *et al.*, 2019a). Participants were asked to indicate how often they have felt for example good (PA) and angry (NA) during the last period using a 5-point scale ranging from *never* (1) to *very often* (5). The internal consistency of the two subscales was good with a Cronbach's alpha value of .84 and .85 for PA and NA subscales respectively.

4. DATA ANALYSIS

A confirmatory factor analysis was carried out using Mplus 7 (Muthén & Muthén, 2017) and with the Maximum Likelihood (ML) estimator. The

model fit was assessed using the ML chi-square test statistic and multiple fit indices (CFI, RMSEA, and SRMR), in line with common guidelines (Hu & Bentler, 1999). The measurement invariance of the scales across gender was examined by means of a hierarchical series of multi-group CFAs, imposing increasingly restrictive equality constraints on model's parameters (van de Schoot, Lugtig, & Hox, 2012). According to the procedure used by Cheung and Rensvold (2002), we considered CFI decreases $< .010$ as more meaningful indicators of chi-square difference tests. Criterion validity was evaluated by examining the correlation of each subscale with PA and NA.

5. RESULTS

Means and standard deviations of the items of the brief scale measuring the satisfaction of basic psychological needs in adolescents are reported in *Table 1*.

Table 1. – Means and standard deviations of the items of the brief scale measuring the satisfaction of basic psychological needs in adolescents.

	AUTONOMY				COMPETENCE				RELATEDNESS			
	Item 1	Item 4	Item 7	Item 10	Item 2	Item 5	Item 8	Item 11	Item 3	Item 6	Item 9	Item 12
M	3.63	3.00	3.60	3.77	3.50	3.73	3.59	3.56	3.38	3.45	3.05	3.49
SD	1.01	1.16	1.06	1.06	1.00	0.99	0.98	.95	.94	.95	1.02	.88

The results of the CFA showed that the posited model met the multiple criteria for adequate fit (CFI = .962; RMSEA = .059; SRMR = .037), thus confirming the three-factor structure of the scale (Hu & Bentler, 1999). The one-, two- and four-factor solution fitted the data poorer (CFI = .75; .80, .86 respectively) than the three-factor model. *Figure 1* presents the results for the three-factor CFA: all the factor loadings were statistically significant ($p < .001$) and ranged from .68 to .80 for Competence and Relatedness subscales and from .57 to .80 for Autonomy subscale. As expected, the three subscales were positively correlated with each other (Autonomy with Competence: = .72, $p < .001$; Autonomy with Relatedness: = .51, $p < .001$; Competence with Relatedness: = .62, $p < .001$). The internal consistency of Autonomy subscale was acceptable, with a Cronbach's alpha value of .72, whereas it was good for both Competence and Relatedness subscales, with a Cronbach's alpha value of .83 and .80 respectively.

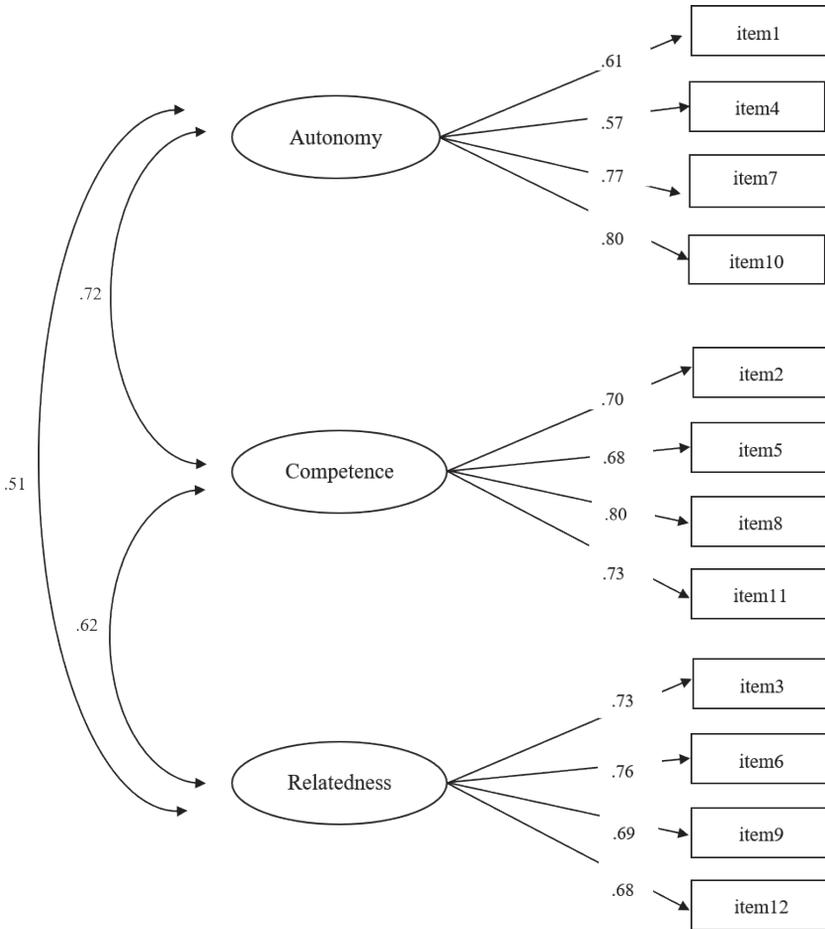


Figure 1. Confirmatory factor analysis results.

Note: All the estimates are standardized. All the estimates are statistically significant with $p < .001$.

The results of the multigroup CFAs showed the configural, metric and scalar invariance of the scale across gender (Metric invariance: $\Delta CFI = .006$; Scalar invariance: $\Delta CFI = .003$).

The statistically significant positive correlation of each of the three psychological needs with psychological well-being provided support for the

criterion validity of the scale: autonomy, competence and relatedness satisfaction were positively related to PA (Autonomy = .36, $p < .001$; Competence = .55, $p < .001$; Relatedness = .43, $p < .001$), and negatively related to NA (Autonomy = -.14, $p < .05$; Competence = -.13, $p < .05$; Relatedness = -.12, $p < .05$).

6. DISCUSSION

The aim of the present study was to examine the psychometric properties and the validity of a brief scale for adolescents measuring the satisfaction of the three basic needs for autonomy, competence, and relatedness. Our results confirmed the three distinct dimensions of the scale, one for each basic psychological need (autonomy, competence and relatedness). The dimensions were related, but also distinct, as shown by the fact that the one factor solution had a very bad fit to the data. Although a small number of items were used to measure each dimension, the scale proved to have good internal consistency. The scale was found to have complete configural, metric and scalar invariance across gender, therefore it can be reliably used to compare the scores obtained by males and females in the satisfaction of psychological needs. Need satisfaction is widely recognized to have an impact on psychological well-being (Deci & Ryan, 2000; Alivernini, Cavicchiolo, Girelli *et al.*, 2019). The positive correlations of the subscales with PA, and their negative correlation with NA provided evidence for criterion validity.

On the whole, the results of our study showed that the brief scale measuring the satisfaction of basic psychological needs in adolescents had good psychometric properties. This scale has several advantages. It is a concise and reliable instrument that can be easily used with adolescents to measure the level of satisfaction of their psychological needs. The scores are straightforward to interpret, and this makes the scale easy to use in many different contexts, such as in education or in evaluation programs as a screening instrument.

7. EDUCATIONAL IMPLICATION

An extensive body of literature has demonstrated that the satisfaction of basic psychological needs in adolescence has a fundamental role in predicting positive outcomes such as well-being (Deci & Ryan, 2000; Vansteenk-

iste & Ryan, 2013; Alivernini, Cavicchiolo, Girelli *et al.*, 2019; Alivernini, Cavicchiolo, Manganelli *et al.*, 2019a; Alivernini, Cavicchiolo, Manganelli *et al.*, 2019b), prosocial behaviour (Cheon, Reeve, & Ntoumanis, 2018), academic success (Hardre & Reeve, 2003; Ratelle *et al.*, 2007; Girelli, Alivernini, Lucidi *et al.*, 2018; Girelli, Alivernini, Salvatore *et al.*, 2018), and negative outcomes such as social isolation (Alivernini, Cavicchiolo, Girelli *et al.*, 2019; Cavicchiolo, Girelli, Lucidi *et al.*, 2019), bullying and victimization (Lam *et al.*, 2015; Chen, Wang, & Sung, 2018; Cavicchiolo, Girelli, Di Leo *et al.*, 2019). Measuring the satisfaction of basic psychological needs in adolescents may help in predicting these educational outcomes in the future (Niemiec & Ryan, 2009; Vansteenkiste & Ryan, 2013). In addition the scale allows to reliably measure the effects of specific school-based interventions aimed at promoting psychological need satisfaction and preventing from need thwarting (Gunnell *et al.*, 2013; Alivernini, Manganelli, & Lucidi, 2016; Girelli *et al.*, 2016; Pischetola & Heinsfeld, 2018).

APPENDIX 1

The items of the brief scale measuring the satisfaction of basic psychological needs in adolescents. Autonomy items: 1, 4, 7 and 10. Competence items: 2, 5, 8 and 11. Relatedness items: 3, 6, 9 and 12. *English version.*

- 1 I feel free to decide for myself how to do my things.
- 2 I feel good at doing many things.
- 3 I like the people I interact with.
- 4 I feel like I am free to decide for myself how to live my life.
- 5 I am able to learn interesting new skills.
- 6 I get along with people I meet.
- 7 Generally, I feel free to express what I really think.
- 8 I get much of a chance to show how capable I am.
- 9 I consider the people I regularly interact with to be my friends.
- 10 I feel like I can pretty much be myself.
- 11 People tell me that I am good at what I do.
- 12 People are generally pretty friendly towards me.

APPENDIX 2

The brief scale measuring the satisfaction of basic psychological needs in adolescents. Autonomy items: 1, 4, 7 and 10. Competence items: 2, 5, 8 and 11. Relatedness items: 3, 6, 9 and 12. *Italian version.*

La scala breve di soddisfazione dei bisogni psicologici di base negli adolescenti.

	Per niente vero	Poco vero	Abbastanza vero	Molto vero	Del tutto vero
Leggi attentamente le seguenti frasi e pensa alla tua vita. Indica quanto ciascuna frase è vera per te, da <i>per niente a del tutto</i>, mettendo una crocetta sul quadratino corrispondente.					
1. Mi sento libero/a di decidere come fare le mie cose.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
2. Mi sento bravo/a a fare molte cose.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. Mi piacciono le persone che incontro.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. Sento di poter scegliere come vivere la mia vita.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. Mi sento capace di imparare a fare cose nuove.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
6. Vado d'accordo con le persone che incontro.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. Mi sento libero/a di dire quello che penso veramente.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. Ho la possibilità di far vedere le mie capacità.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. Considero amiche le persone che frequento spesso.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. Sento che posso essere me stesso/a.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11. Mi dicono che sono bravo/a in quello che faccio.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
12. Le persone che incontro sono amichevoli con me.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

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RIASSUNTO

La letteratura ha mostrato che la soddisfazione dei bisogni psicologici di base, come definiti dalla teoria dell'Autodeterminazione (SDT), ha un forte impatto positivo sul benessere, sulla prosocialità e sul successo accademico degli adolescenti. Lo studio qui presentato ha lo scopo di validare una scala breve che misuri la soddisfazione dei bisogni psicologici di autonomia, competenza e relazionalità negli adolescenti. La scala comprende 12 item che sono stati selezionati e adattati per gli adolescenti dalla versione originale della scala di Soddisfazione dei Bisogni Psicologici di Base (BPNS) attraverso uno studio qualitativo preliminare. La scala breve è stata analizzata in termini di dimensionalità, invarianza della misura e validità di criterio utilizzando un campione di 308 adolescenti italiani (età media = 14,04 anni; 57,1% maschi). Analisi fattoriali di tipo confermativo hanno stabilito la struttura a tre fattori della misura e hanno mostrato la sua invarianza rispetto al genere. A supporto della sua validità di criterio, è stata riscontrata una correlazione positiva tra ciascuna delle dimensioni della scala e il benessere psicologico. La scala breve ha dimostrato di essere uno strumento valido e affidabile per misurare i livelli di soddisfazione dei bisogni psicologici di autonomia, competenza e relazionalità negli adolescenti.

Parole chiave: Adolescenti; Bisogni psicologici di base; Invarianza misura; Scala; Validazione.

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