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Psychometric Validation and Measurement Invariance of the Flourishing Scale (FS) in the Algerian Context

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Supplementary Materials: Data, Materials [see Index of Supplementary Materials]

Abstract

This study aims to validate the psychometric properties of the Flourishing Scale (FS) within the Algerian context, contributing to the understanding of psychological well-being in non-Western settings. Flourishing reflects an individual's perception of leading a fulfilling and meaningful life, with optimal functioning across social, emotional, and psychological domains. Using a sample of 365 university students, the study evaluated the FS alongside the Satisfaction with Life Scale. EFA and CFA were conducted to examine the FS structure, along with internal consistency and validity assessments. The results demonstrated strong psychometric properties, confirming the scale's unidimensionality, high internal consistency, and validity as a measure of flourishing in Algeria. Measurement invariance analysis further confirmed that the FS retains its psychometric robustness across gender and age groups, reinforcing its applicability in diverse populations. Correlations with SWLS further supported its construct validity. The findings support the use of the FS in Algerian settings to assess psychological well-being. Future research should explore its applicability across diverse demographic groups and investigate its relationships with other constructs, such as resilience and work-life balance.

Keywords

Flourishing Scale, psychometric validation, psychological well-being, Algerian context

Flourishing is an optimal state of human well-being that integrates physical, psychological, and social dimensions. It represents positive functioning across life domains, empha-

sizing holistic well-being rather than isolated factors. Scholars categorize well-being into hedonic and eudaimonic dimensions. Hedonic well-being focuses on life satisfaction, pleasure, and happiness, while eudaimonic well-being emphasizes fulfilling one's potential, finding purpose, and deriving meaning from life. These concepts collectively provide a comprehensive framework for understanding human thriving (Diener et al., 1999; Ryff & Singer, 2008).

Flourishing in Positive Psychology

Flourishing is often regarded as the pinnacle of psychological well-being, representing a state of optimal human functioning characterized by heightened well-being, engagement, and meaning in life. Positive psychology defines flourishing as involving positive emotions, strong relationships, and a sense of purpose contributing to a fulfilling and resilient life (Seligman & Csikszentmihalyi, 2000). This concept emphasizes that true well-being is not merely the absence of negativity but the presence of enriching experiences that empower individuals to thrive. Moreover, flourishing goes beyond mere happiness to involve thriving in various life domains. Seligman's PERMA model delineates five key elements of flourishing: positive emotions, engagement, relationships, meaning, and accomplishment, offering a practical framework for enhancing well-being. Similarly, VanderWeele (2017) identifies six critical domains—happiness and life satisfaction, mental and physical health, meaning and purpose, character and virtue, close social relationships, and financial/material stability—highlighting the interplay between subjective well-being, interpersonal connections, and broader societal factors (Keyes, 2002; Seligman, 2011; VanderWeele, 2017).

Cross-Cultural Validation and the Algerian Context

The measurement of flourishing has gained traction across diverse cultural settings. Among these, Diener et al. (2010) developed the Flourishing Scale (FS), an 8-item instrument designed to measure eudaimonic well-being through aspects such as relationships, self-esteem, purpose, and optimism. Extensive validation studies confirm its strong psychometric properties, including internal consistency, factor structure, and measurement invariance. In China, the FS has been validated among university students, showcasing its applicability within East Asian cultural contexts. Similarly, studies in Spain, Italy, and Japan confirm its reliability and validity, emphasizing its consistency across Western and Eastern settings. Furthermore, research in Canada, Turkey, Malaysia, and South Africa supports the FS's robustness in diverse populations (De la Fuente et al., 2017; Giuntoli et al., 2017; Mostert et al., 2023; Romano et al., 2020; Senol-Durak & Durak, 2019; Seok et al., 2022; Sumi, 2014; Tong & Wang, 2017). In the Arab world, the FS has demonstrated reliability and validity through studies conducted in Saudi Arabia and Egypt, affirming

its utility in measuring psychological flourishing within Arabic-speaking populations (Al-Dossary, 2021; Salama-Younes, 2017).

The literature concerning mental health emphasizes the importance of measuring flourishing as a tool to understand and enhance psychological well-being among university students. According to a systematic literature review on mental health challenges faced by Algerian university students, studies indicate a pressing need for reliable measurement tools that assess the various psychological dimensions affecting student experiences (Mansouri, 2024). While well-being has been extensively explored globally, Algeria remains an underrepresented context in well-being research. As Africa's largest country, its socio-economic transformations, cultural diversity, and regional disparities create a unique environment for studying psychological flourishing. With a moderate ranking of 85th on the 2024 World Happiness Index and a score of 5.364, Algeria faces challenges such as an unemployment rate projected at 11.33% and significant disparities among urban youth in cities like Algiers and Oran. These factors underscore the urgent need for valid and culturally adapted measurement tools like the Flourishing Scale to provide meaningful insights into student well-being. A better understanding of flourishing in this context can contribute to the development of evidence-based intervention programs aimed at supporting students and improving their educational experiences (Statista, 2024; World Population Review, 2024).

Aims of the Present Study

The present study aims to validate the Flourishing Scale within the Algerian context by examining its psychometric properties among university students. The research seeks to assess the scale's internal consistency, factor structure, and measurement invariance across key demographic groups (e.g., gender and age), as well as its correlations with other well-being measures, such as life satisfaction. University students were specifically chosen for this study as they represent the elite of Algerian society and serve as future leaders and key decision-makers, making them a critical population for understanding and promoting psychological flourishing within the national context. This comprehensive approach is intended to enhance our understanding of flourishing within the Algerian setting, thereby informing future interventions and policies aimed at improving overall well-being.

Method

Participants and Procedure

The study included 365 university students from various universities across Algeria, comprising 157 males (43%) and 208 females (57%). The age distribution was as follows: 261 participants (71.5%) were aged between 18–30 years, and 104 participants (28.5%)

were aged between 31–45 years (M = 1.28, SD = 0.452). Regarding education level, 182 participants (49.9%) were undergraduate students, and 183 participants (50.1%) were graduate students. Regarding employment status, 169 (46.3%) were employed, while 196 (53.7%) were unemployed.

We estimated the sample size based on the number of parameters used in our statistical analysis, specifically for confirmatory factor analysis (CFA) and exploratory factor analysis (EFA). According to the general rule of thumb of ten participants per parameter, we focused on two scales: the Flourishing Scale (FS) with 8 items and the Satisfaction with Life Scale (SWLS) with 5 items, totaling 13 items. Therefore, the minimum required sample size was determined to be 130 participants. Our actual sample size of 365 participants exceeds this minimum, ensuring sufficient statistical power and reliability for both CFA and EFA. This estimation aligns with the guidelines provided by MacCallum et al. (1996).

Data were collected online through a structured electronic questionnaire designed using Google Forms. The questionnaire included demographic questions (gender, age, education level, and employment status), the Flourishing Scale (FS), and the Satisfaction with Life Scale (SWLS). Participants were informed about the study's purpose, assured of the confidentiality of their responses, and instructed to answer honestly. Participation was voluntary. The questionnaire link was distributed via social media platforms, such as Facebook (targeting university student groups), and through email. The study was conducted between August and November 2024.

Measures

The Flourishing Scale (FS), developed by Diener et al. (2010) and later validated in Arabic by Al-Dossary (2021), evaluates participants' psychological well-being. This scale comprises 8 items, each rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores signify greater levels of flourishing. An example of an item is, "I lead a purposeful and meaningful life."

The Satisfaction with Life Scale (SWLS), created by Diener et al. (1985) and translated into Arabic by Abdallah (1998), measured participants' overall life satisfaction. This scale includes five items, with responses scored on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). An example of an item is, "In most ways, my life is close to my ideal."

Data Analysis

Data analysis was conducted using IBM SPSS Statistics (Version 27.0; IBM Corporation, 2020) for descriptive statistics and exploratory factor analysis (EFA), and IBM AMOS (Version 24.0; Arbuckle, 2016) for confirmatory factor analysis (CFA). Data screening

included assessments of skewness and kurtosis, adhering to thresholds of ±2 and ±7, respectively, to evaluate normality (Kline, 2015).

EFA was performed using Principal Component Analysis (PCA), with the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy (≥ 0.70) and Bartlett's Test of Sphericity ($p < .05$) to determine the suitability for factor analysis (Hair et al., 2019). Factors were retained based on eigenvalues greater than 1 and cumulative variance exceeding 60% (Field, 2018).

CFA was used to validate the factor structure, utilizing various fit indices: the chi-square to degrees of freedom ratio ($\chi^2/df \leq 3$; Hair et al., 2019), the Comparative Fit Index (CFI ≥ 0.90), the Tucker-Lewis Index (TLI ≥ 0.90), the Root Mean Square Error of Approximation (RMSEA ≤ 0.08; Steiger, 1990), and the Standardized Root Mean Square Residual (SRMR ≤ 0.08; Hu & Bentler, 1999). Reliability was assessed using Cronbach's alpha (≥0.70; George & Mallery, 2003) and composite reliability (CR ≥ 0.70; Fornell & Larcker, 1981), with convergent validity supported by an average variance extracted (AVE) of at least 0.50.

The measurement invariance of the three-factor model was evaluated across gender and age using a sequential approach. Model comparisons focused on changes in χ^2/df, CFI, RMSEA, and SRMR, with a change in CFI (ΔCFI) of less than 0.01 considered evidence of invariance (Cheung & Rensvold, 2002). Additionally, Pearson's correlation assessed item correlations for the Flourishing Scale (FS) and the relationship between flourishing and life satisfaction, with a correlation coefficient (r) of 0.30 or higher indicating moderate to strong convergent validity (Cohen, 1988). Differences across demographic variables were analyzed using independent samples t-tests and one-way ANOVA (Cohen, 1988).

Results

Descriptive Statistics

Descriptive statistics were calculated for the items of the FS – Algerian Version, as presented in Table 1. The mean scores for the items ranged from 4.75 to 5.76, with standard deviations between 1.36 and 1.61, indicating moderate variability in responses. Skewness values ranged from -1.22 to -0.67, and kurtosis values ranged from -0.31 to 1.19. These values fall within the acceptable thresholds of ±2 for skewness and ±7 for kurtosis (Kline, 2015), suggesting that the data distribution for all items approximates normality. This supports the appropriateness of the data for subsequent statistical analyses, including factor analysis.

Table 1

Descriptive Statistics of the FS-Algerian Version

Item	Min.	Max.	*M*	*SD*	Skewness	Kurtosis
Item 1	1	7	5.17	1.56	-0.77	-0.11
Item 2	1	7	4.23	1.61	-0.74	-0.27
Item 3	1	7	4.95	1.59	-0.67	0-.31
Item 4	1	7	4.78	1.61	-0.75	-0.16
Item 5	1	7	5.62	1.36	-1.19	1.19
Item 6	1	7	5.18	1.41	-0.74	0.13
Item 7	1	7	5.58	1.51	-1.22	1.00
Item 8	1	7	5.76	1.39	-1.22	0.97

Note. *M* = Mean; *SD* = Standard Deviation.

Exploratory Factor Analysis (EFA)

Exploratory factor analysis (EFA) was conducted using principal component analysis (PCA) to evaluate the scale's structure. Results indicated excellent sampling adequacy (KMO = .898) and significant sphericity (χ^2 = 1154.840, df = 28, p < .001), confirming the suitability of the data for factor analysis. A single factor was extracted, explaining 60.71% of the total variance. Factor loadings ranged from .59 to .78, with communalities between .35 and .60, indicating that most items contributed substantially to the extracted factor. These results support the unidimensionality of the scale and its validity for measuring the intended construct.

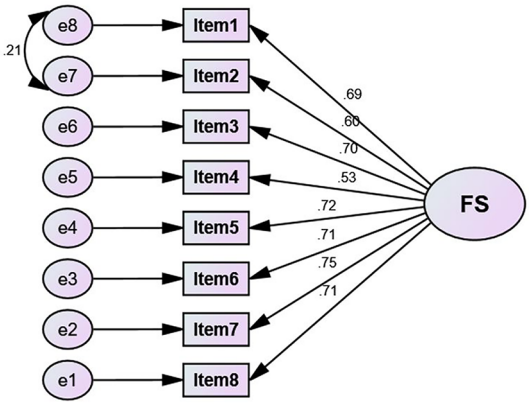
Confirmatory Factor Analysis (CFA)

The confirmatory factor analysis (CFA) revealed a marginally acceptable model fit for the initial model with a chi-square statistic (χ^2 = 78.941, df = 20, p < .001) and a chi-square to degrees of freedom ratio (χ^2/df = 3.947). Fit indices, including RMSEA (.09; 90% CI [.070, .111]), SRMR (.04), GFI (.947), CFI (.948), and TLI (.927), provided mixed evidence of validity, with RMSEA suggesting potential misfit. Factor loadings ranged from .53 to .75, indicating strong relationships between the latent construct and its indicators.

Examination of modification indices indicated improved model fit when the error covariance was freed between Items 1 and 2, both driven by social relationships that foster purpose, share variance beyond the flourishing factor, justifying the adjustment. The revised model yielded a chi-square statistic (χ^2 = 66.015, df = 19, p < .001) and a chi-square to degrees of freedom ratio (χ^2/df = 3.474). Fit indices improved with RMSEA (.08; 90% CI: .061–.105), SRMR (.03), GFI (.958), CFI (.959), and TLI (.939). Factor loadings remained consistent, ranging from .53 to .75, further supporting the validity of the refined model. See Figure 1 for the revised CFA model.

Figure 1

Confirmatory Factor Analysis (CFA) Revised Model of the FS-Algerian Version



Reliability and Validity

Reliability analysis confirmed good internal consistency with a Cronbach's alpha of .87, composite reliability (CR) of .87, and average variance extracted (AVE) of .46.

The inter-item correlations for the FS-Algerian version (Table 2) demonstrate positive and statistically significant relationships among all eight items at $p < 0.01$, with Pearson correlation coefficients ranging from .46 to .76. These results indicate strong internal consistency, supporting the unidimensional structure of the scale. Overall, the findings confirm the scale's reliability and its suitability for assessing flourishing as a cohesive construct.

Table 2

Item Correlations for the FS – Algerian Version

Item	1	2	3	4	5	6	7	8
Item 1								
Item 2	.66**	—						
Item 3	.68**	.63**	—					
Item 4	.49**	.49**	.46**	—				
Item 5	.66**	.51**	.63**	.58**	—			
Item 6	.63**	.55**	.62**	.52**	.76**	—		
Item 7	.69**	.62**	.66**	.49**	.66**	.67**	—	
Item 8	.59**	.53**	.59**	.59**	.75**	.70**	.68**	

**$p < .01$ (two-tailed).

Measurement Invariance

The measurement invariance of the three-factor model was evaluated for gender and age as shown in Table 3, the model fit indices were satisfactory for both groups. For gender, the χ^2/df values ranged from 2.44 to 2.63, with CFI values between .924 and .950, and RMSEA values slightly above the ideal cutoff. For age, the χ^2/df values ranged from 2.24 to 2.50, with CFI values between .936 and .952, and RMSEA values from .058 to .064. These results support the invariance of the three-factor model across gender and age.

Table 3

Measurement Invariance for the Three-Factor Model Across Gender and Age

Model	χ^2	*df*	χ^2/df	CFI	RMSEA (90% CI)	SRMR	ΔCFI
Gender invariance							
Model 1	97.28	38	2.56	.950	.066 (0.05–0.08)	.056	—
Model 2	109.58	45	2.44	.945	.063 (0.04–0.07)	.069	.003
Model 3	144.71	55	2.63	.924	.067 (0.05–0.08)	.096	.021
Age invariance							
Model 1	95.06	38	2.50	.951	.064 (0.04–.081)	.042	—
Model 2	100.67	45	2.24	.952	.058 (0.04–.074)	.043	.001
Model 3	129.56	55	2.36	.936	.061 (0.04–.075)	.049	.016

Note. χ^2 = Chi-square; *df* = degree of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMS = Standardized Root Mean Square Residual

Concurrent Validity

To assess the concurrent validity of the Flourishing Scale, a significant positive correlation was found between the Satisfaction with Life Scale (SWLS) and flourishing, with a Pearson correlation coefficient of $r = .46$ ($p < .01$). This indicates a moderate positive relationship, suggesting that higher levels of life satisfaction are associated with greater flourishing within the study sample.

Differences Across Variables

The impact of demographic variables—gender, age, education level, and work status—on flourishing was analyzed. Gender differences showed no significant effect, with men ($M = 41.53$, $SD = 8.085$) and women ($M = 41.97$, $SD = 9.258$) having similar flourishing scores, $t(363) = -0.472$, $p = .637$. Age groups (18–30 years, 31–45 years) also did not show significant differences, $t(363) = -0.728$, $p = .467$. No significant differences in flourishing were found between undergraduate ($M = 41.15$, $SD = 8.483$) and graduate students ($M = 42.40$, $SD = 9.015$), $t(363) = -1.359$, $p = .175$. Similarly, work status did not show significant differences, with employed participants ($M = 42.69$, $SD = 8.377$) reporting slightly higher

flourishing scores than unemployed participants (M = 40.99, SD = 9.031), $t(363)$ = 1.845, p = .066. These results suggest that demographic variables do not significantly affect flourishing in the sample.

Discussion

The study's findings demonstrated strong psychometric properties of the Flourishing Scale (FS) within the Algerian context. Exploratory factor analysis confirmed its unidimensionality, showing strong factor loadings and adequate variance explained, thereby validating its structure. Confirmatory factor analysis further supported the model's fit, which improved with minor adjustments based on modification indices. Reliability analysis indicated high internal consistency and composite reliability, reinforcing the scale's suitability for assessing flourishing. The measurement invariance results indicate that the three-factor model exhibits robust stability and acceptable fit across gender and age groups, supporting valid comparisons. The scale also showed a moderate positive relationship with life satisfaction, highlighting its construct validity. Furthermore, demographic variables such as gender, age, education level, and employment status did not significantly impact flourishing, underscoring the scale's applicability across diverse groups within the study sample.

These findings align closely with previous research. Diener et al. (2010) initially established the FS as a reliable measure of well-being, designed to assess psychological flourishing across various domains, including relationships, purpose, and optimism. Similar validations in diverse cultural settings, such as Spain and Turkey (De la Fuente et al., 2017; Senol-Durak & Durak, 2019), confirmed its unidimensionality and high internal consistency. In line with these studies, our results further corroborate the FS's stable factorial structure, with the Turkish context providing additional evidence of invariance across gender groups. Moreover, the Malaysian study by Seok et al. (2022) not only reported a single-factor solution through both EFA and CFA but also demonstrated measurement invariance by gender and a significant positive correlation with life satisfaction—findings that resonate with our evidence of convergent validity. Reliability metrics, including Cronbach's alpha and composite reliability, reaffirm the FS as a dependable tool for measuring flourishing.

The FS's cross-cultural applicability has been broadly demonstrated. Studies in Saudi Arabia and South Africa (Al-Dossary, 2021; Mostert et al., 2023) confirmed the FS's unidimensionality and high internal consistency, along with measurement invariance across gender and language groups. Comparative analyses in Spain and Italy (De la Fuente et al., 2017; Giuntoli et al., 2017) also supported the FS's validity, showing consistent factor loadings and good model fit across demographic and cultural groups. Furthermore, validations in Japan and China (Sumi, 2014; Tong & Wang, 2017) reinforce the single-dimensional structure of flourishing, mirroring the pattern observed in our Algerian

sample. These converging findings across diverse cultural settings further support the FS's robustness and cross-cultural consistency, with correlations between flourishing and life satisfaction emerging as a recurrent theme.

The FS's discriminant validity is evident in its ability to distinguish flourishing from related constructs such as depression, anxiety, and stress. This aligns with findings from European contexts (De la Fuente et al., 2017; Huppert & So, 2013), where the FS consistently differentiated well-being from other psychological states. These results underscore the FS as a multidimensional measure of well-being, encompassing both hedonic and eudaimonic components, as supported by studies in Italy (Giuntoli et al., 2017).

In terms of cultural nuances, the Algerian validation contributes to the growing evidence that the FS is adaptable to non-Western contexts. While some studies, particularly in Europe (Huppert & So, 2013), advocate for a multidimensional approach to well-being, the consistent unidimensionality observed across validations—including those in Turkey (Senol-Durak & Durak, 2019), Malaysia (Seok et al., 2022), Japan (Sumi, 2014), and China (Tong & Wang, 2017)—supports the FS's design as a single-factor measure of flourishing. Additionally, the FS's high internal consistency across cultural settings highlights its reliability in measuring a holistic concept of well-being, further affirming its utility in diverse populations.

Limitations and Future Directions

This study demonstrated strong psychometric properties for the Flourishing Scale (FS) in the Algerian context, but certain limitations should be addressed. The sample was limited to university students, restricting the generalizability of the findings to other populations. Future research should validate the FS across broader demographic and cultural groups. The cross-sectional design also limits causal inferences, highlighting the need for longitudinal studies to assess the stability of flourishing and its interactions with related constructs over time.

Additionally, exploring the FS's relationship with culturally specific constructs and using qualitative approaches could enhance its contextual relevance. Further investigations into measurement invariance across diverse subgroups, such as rural versus urban populations, would ensure its reliability across Algeria's demographic diversity. Addressing these gaps will strengthen the scale's applicability and contribute to a deeper understanding of well-being in diverse settings.

Conclusion

This study validated the Flourishing Scale (FS) within the Algerian context, confirming its reliability and construct validity as a measure of psychological well-being. The FS demonstrated a robust unidimensional structure, strong internal consistency, and meaningful correlations with other well-being indicators, reinforcing its applicability in

non-Western settings. By adapting and validating the scale for university students, this research bridges an important gap in understanding flourishing in culturally specific contexts and provides a practical tool for assessing well-being. The findings underscore the scale's versatility across demographic groups and its potential for broader applications. Future studies should expand its use across different populations and explore its connections with constructs like resilience and work-life balance to deepen its relevance in promoting psychological health.

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Competing Interests: The author has declared that no competing interests exist.

Ethics Statement: This study adhered to the ethical standards of relevant institutional and national committees and the 1964 Helsinki Declaration (and its later amendments), ensuring participants' rights, confidentiality, and informed consent.

Data Availability: For this article, data is freely available (see Mansouri, 2025).

Supplementary Materials

For this article, the following Supplementary Materials are available (see Mansouri, 2025):

- data_SPSS used for analyses in SPSS and AMOS.
- Syntax SPSS Flourishing Scale (FS) in the Algerian Context.
- Cfa_Amos Model 1 Flourishing Scale (FS) in the Algerian Context.
- Cfa_Amos Updated Model 1 Flourishing Scale (FS) in the Algerian Context.
- Measurement invariance for the three-factor model across gender.
- Measurement invariance for the three-factor model across age.

Index of Supplementary Materials

Mansouri, M. (2025). *Supplementary materials to "Psychometric validation and measurement invariance of the Flourishing Scale (FS) in the Algerian context"* [Data, materials]. OSF. https://doi.org/10.17605/OSF.IO/D7QVG

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