Article of scientific and technological research

Dimensionality and internal consistency of the Health-Promoting Lifestyle Profile (HPLP-II) in university students

Dimensionalidad y consistencia interna del Perfil de Estilo de Vida que Promueve la Salud (HPLP-II) en estudiantes universitarios

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ABSTRACT

Introduction: Lifestyles refer to the habitual behaviors each person presents and characterizes based on their health. However, the psychometric characteristics of the Health-Promoting Lifestyle Profile (HPLP-II) are unknown. **Objective**: To evaluate the dimensionality and reliability of the HPLP-II in Colombian university students. **Method**: A psychometric study was carried out with the participation of 293 university students over 18 years who completed the HPLP-II. Exploratory factor analysis was performed using the principal components method. Reliability was estimated using Cronbach's alpha coefficient. **Results**: Five factors were identified that explained 63.6% of the variance. The factor coefficients of the items were observed between 0.44 and 0.78. Internal consistency was acceptable per factor, with Cronbach's alpha values between 0.82 and 0.91. **Conclusion**: The questionnaire's psychometric properties show adequate values in most adjustment indices, but not in all, which is why new applications must be made to confirm the instrument's suitability to measure lifestyles in the Colombian population.

Keywords: Healthy lifestyles; Students; Factor analysis; Validation study; Colombia

RESUMEN

Introducción: los estilos de vida hacen alusión a las conductas habituales que presenta y caracteriza a cada persona en función a su salud. Sin embargo, se desconoce las características psicométricas del Perfil de Estilo de Vida que Promueve la Salud (*Health-Promoting Lifestyle Profile*, HPLP-II). **Objetivo:** evaluar la dimensionalidad y la confiabilidad del HPLP-II en estudiantes universitarios colombianos. **Método:** se realizó un estudio psicométrico con la participación de 293 universitarios, mayores de 18 años que diligenciaron el HPLP-II. Se realizó análisis factorial exploratorio por el método de componentes principales. Se estimó la confiabilidad con el coeficiente de alfa de Cronbach. **Resultados:** se identificaron cinco factores que explicaban el 63,6% de la varianza. Los coeficientes factoriales de los ítems se observaron entre 0,44 y 0,78. La consistencia interna fue adecuada por factor con valores de alfa de Cronbach entre de 0,82 y 0,91. **Conclusión:** las propiedades psicométricas del cuestionario muestran valores adecuados en la mayoría de índices de ajustes, pero no en todos, por lo cual se deben realizar nuevas aplicaciones que confirmen la idoneidad del instrumento para medir estilos de vida en población colombiana.

Palabras claves: estilos de vida saludables; estudiantes; análisis factorial; estudio de validación; Colombia.

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INTRODUCTION

Lifestyles are people's daily behaviors or habits to meet needs and achieve personal development. They are related to personal, economic, social, and environmental factors.[1-3] Some lifestyles are physical activity, nutrition, interpersonal relationships, spiritual growth, responsibility for health, and stress treatment.[4]

Currently, there is sufficient evidence to show that lifestyles have a significant influence on human health.[5,6] It has been described as positively influencing the management and prevention of chronic diseases,[7,8] on self-esteem, the quality of life of older people, and the promotion of healthy habits in the family environment,[9] and delays the onset of disability.[10]

The university population usually lives in a life cycle period where some habits related to a healthy and successful transition into adulthood are consolidated.[11-14] However, the adoption of risky health behaviors, diseases,[15] and repercussions on academic performance have also been found in this population.[16]

Few instruments evaluate lifestyles in English, including the Fantastic,[17] the (PEPS-I),[18] the Healthy Lifestyles Questionnaire (HLQ),[19] and the Health-Promoting Lifestyle Profile (HPLP).[20]

Walter et al.[21] performed a psychometric analysis of the HPLP in 952 adults and reported six dimensions: Self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management.[21] Subsequently, Walter et al.[22] evaluated a Spanish version of the HPLP and concluded that it was culturally relevant and reliable with six dimensions. Likewise, Kuster et al.[23] reported a Cronbach's alpha coefficient of 0.94 for the Spanish version.

This instrument has been translated and psychometrically validated, considering various linguistic and cultural groups from the original English version.[24] These studies showed acceptable validity and reliability indicators for the original version of the six dimensions. However, they reported variability in the discriminant validity of the six dimensions individually, especially the nutrition dimension, which needs to reach appropriate levels of reliability.

However, Pérez-Fortis et al.[25] observed that the six-dimensional factor solution presented a moderate fit and suggested that eliminating six items improved the psychometric indicators. A similar finding was observed in other Spanish versions.[26]

Consequently, validation studies carried out in different languages and latitudes have shown the need for review, validation, and cultural adaptation of the different dimensions of the instrument due to the cultural irrelevance of some items and even the semantic variation that may occur within them in the same language.[24] In Colombia, HPLP has been used; however, to date, the performance of the instrument in the Colombian population is unknown.[25,26]

Health professionals must have validated instruments that respond to the demands that people demand, mainly those implicit in daily practices, such as lifestyles, to serve as input for decision-making and the formulation of relevant programs and policies that adapt to the characteristics and needs of the population to intervene.

The World Health Organization has stated that the university population faces significant lifestyle changes.[24] Therefore, promoting healthy behaviors becomes a challenge for public health.

This research aimed to evaluate the dimensionality and internal consistency of the HPLP-II in Colombian university students.

METHOD

Study design

A methodological study was designed to study the psychometric characteristics of a lifestyle measurement instrument.

Participants

The sample was selected through non-probabilistic sampling for convenience and comprised 292 university students with permanent residence in Pamplona, Colombia. The mean age of the sample was 21.1 (SD=2.7). See more population characteristics in Table 1.

Table 1. Description of the sample.

Variable	Frequency	%
Biological sex		
Women	233	79.8
Men	58	19.9
He/she preferred not to say	1	0.3
Program academic		
Psychology	95	32.5
Nursing	22	7.5
Physiotherapy	92	31.5
Speech therapy	41	14.0
Bacteriology	30	10.3
Therapy occupational	6	2.1
Nutrition	6	2.1
Civil status		
Single	277	94.9
Married	3	1.0
Free union	12	4.1
Stratum socioeconomic		
Low	159	54.5
Middle low	110	37.7
Middle	22	7.5
Middle high	1	0.3
Body mass index (BMI)		
Underweight	29	9.9
Normal weight	193	66.1
Overweight	55	18.8
Obesity	15	5.1
Religion		
Catholic	176	12.2
Christian	31	2.1

None	84	5.8
Other	1	0.1

Instruments

The original HPLP is made up of 52 items divided into the dimensions: Health responsibility (nine items), physical activity (eight items), nutrition (nine items), spiritual growth (nine items), interpersonal relationships (nine items), and management of stress (eight items). The items offer four response options: Never, sometimes, almost always, and always.[23]

Procedure and harvest of the information

A Google Forms questionnaire link was sent, where the informed consent, essential sociodemographic variables, such as sex, age, and program of the health school to which each participant belonged, and the data to be collected from the HPLP-II instrument were found. Each participant voluntarily and autonomously completed the requested data. The average duration to complete the questionnaire was 20 minutes. The survey group received a week's training on techniques for applying investigative instruments.

Analysis statistics

Initially, the data was analyzed, and Kolmogorov-Smirnov normality tests were applied to confirm the non-parametric behavior of the data. Exploratory analysis was performed, and sample sufficiency was confirmed using the Kaiser-Meier-Olkin (KMO) *and* Bartlett test, with *Oblimin rotation* (Authors started from the hypothesis of a high correlation between the items) and the maximum likelihood extraction method. The confirmatory factor analysis was carried out with a structural equation model (SEM) with the new emerging structure of the exploratory analysis, composed of five factors, and it was checked that the adjustment parameters corresponded to what was suggested by Hair. *et* al.:[27] (normalized chi square ≤ 3.0, TLI > 0.95, CFI > 0.95, RSMEA < 0.08 and SRMR < 0.05). Finally, the levels of internal consistency of each subscale are reviewed with McDonald's omega coefficients (*ω), Cronbach*'s alpha (α), and *Guttman* coefficient (*λ2*) in the two versions. Acceptable values, in this case, should be greater than 0.70.

Statement of aspects of ethical

The information was handled with strict confidentiality and anonymity; participation was voluntary and supported by informed consent, according to the standards established in the Declaration of Helsinki 1975 and Article 11 of Resolution 8430 of 1993 of the Ministry of Health of Colombia.[28]

RESULTS

The exploratory factor analysis showed a KMO of 0.90 and Bartlett's test with a chi-square of 8,203.6 (df =1,326, p<0.001). The factor structure of the original questionnaire is presented in Figure 1. The variance weights were adequate in most items but with low goodness-of-fit indicators.
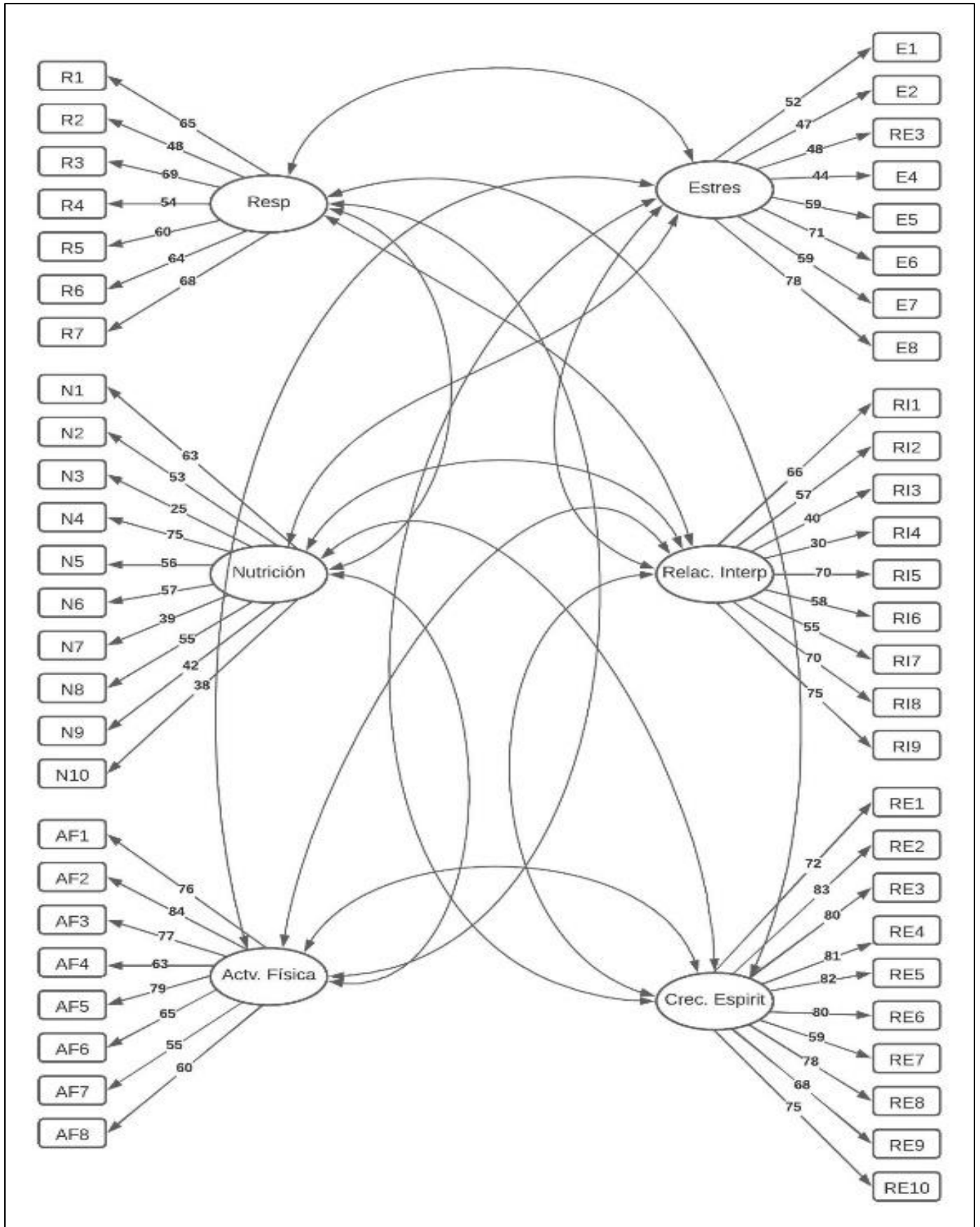
Figure 1. Original six-factor model.

It was observed that several items in the "nutrition" dimension carried more weight of variance in the physical activity factor, so it was decided to perform an exploratory factor analysis to identify some variables in grouping items.

In the exploratory analysis, a grouping into five factors explained 49.7% of the variance of the healthy habits construct. This grouping merged the items with the best factor, loading into a new dimension that incorporated the nutrition and physical activity items in the same factor. See details in Table 2.

Table 2. Exploratory factor analysis.

	F1	F2	F3	F4	F5
R1	0.60				
R2	0.46				
R3	0.66				
R4	0.56				
R5	0.56				
R6	0.82				
R7	0.69				
N1		0.55			
N2		0.49			
N3		0.22			
N4		0.78			
N5		0.46			
N6		0.47			
N7		0.30			
N8		0.34			
N9		0.40			
N10		0.32			
PA1		0.75			
PA2		0.82			
PA3		0.78			
PA4		0.60			
PA5		0.77			
PA6		0.65			
PA7		0.54			
PA8		0.65			
S1			0.47		
S2			0.40		
S3			0.35		
S4			0.36		
S5			0.47		
S6			0.67		
S7			0.68		
E8			0.77		
IR1				0.61	
IR2				0.57	
IR3				0.77	
IR4				0.79	
IR5				0.57	
IR6				0.60	
IR7				0.69	
IR8				0.62	
IR9				0.64	
SG1					0.71
SG2					0.83
SG3					0.80

SG4	0.81
SG5	0.82
SG6	**0.79**
SG7	**0.56**
SG8	**0.79**
SG9	**0.66**
SG10	**0.72**

R = Responsibility; N = Nutrition; PA = Physical activity; S = Stress; IR = Interpersonal relationships, SG = Spiritual growth

On the other hand, a confirmatory structural equation model (SEM) was carried out, with items that exceeded 0.40 in the variance contributing to the corresponding factor, taking the structure obtained in the exploratory analysis. Thus, Figure 2 illustrates a new model with five factors presenting better adjustment indicators than the original model. See Table 3.

Table 3. The goodness of fit indicators of the tested models.

Setting indicators	Six factors (original)	Five factors
Chi-squared	2715	2002
Normalized chi-squared	2.15	2.05
TLI	0.79	0.80
CFI	0.81	0.80
RSMEA	0.06	0.04
SRMR	0.06	0.06

A significant factorial coefficient was observed for each item relative to the proposed dimension in both models. The five-factor model presents slightly more optimal adjustment indicators than the original six-factor model. However, according to the literature, they needed to meet the expected minimums (in TLI and CFI). The findings for internal consistency are presented in Table 4 for six and five factors.

Table 4 . Internal consistency of the factors in the evaluated models.

Dimension	McDonald's ω (95%CI)	Cronbach's α (95%CI)	Guttman's λ2 (95%CI)
F1. Responsibility	0.83 (0.79-0.86)	0.82 (0.81-0.83)	0.83 (0.79-0.86)
F2. Nutrition	0.78 (0.73-0.81)	0.77 (0.76-0.79)	0.78 (0.74-0.82)
F3. Physical activity	0.89 (0.86-0.91)	0.88 (0.88-0.89)	0.89 (0.86-0.91)
F4. Stress management	0.79 (0.74-0.82)	0.78 (0.76-0.80)	0.79 (0.74-0.82)
F5. Relations interpersonal	0.88 (0.85-0.90)	0.88 (0.87-0.89)	0.88 (0.85-0.90)
F6. Relations spiritual	0.93 (0.91-0.94)	0.93 (0.92-0.93)	0.93 (0.91-0.94)
F1. Responsibility	0.83 (0.79-0.86)	0.82 (0.81-0.83)	0.83 (0.79-0.85)
F2. Compound	0.91 (0.89-0.92)	0.90 (0.89-0.91)	0.91 (0.89-0.92)
F3. Stress management	0.79 (0.74-0.82)	0.78 (0.76-0.80)	0.79 (0.74-0.82)
F4. Relations interpersonal*	0.88 (0.85-0.90)	0.88 (0.87-0.89)	0.88 (0.85-0.90)
F5. Relations spiritual*	0.93 (0.91-0.94)	0.93 (0.92-0.93)	0.93 (0.91-0.94)

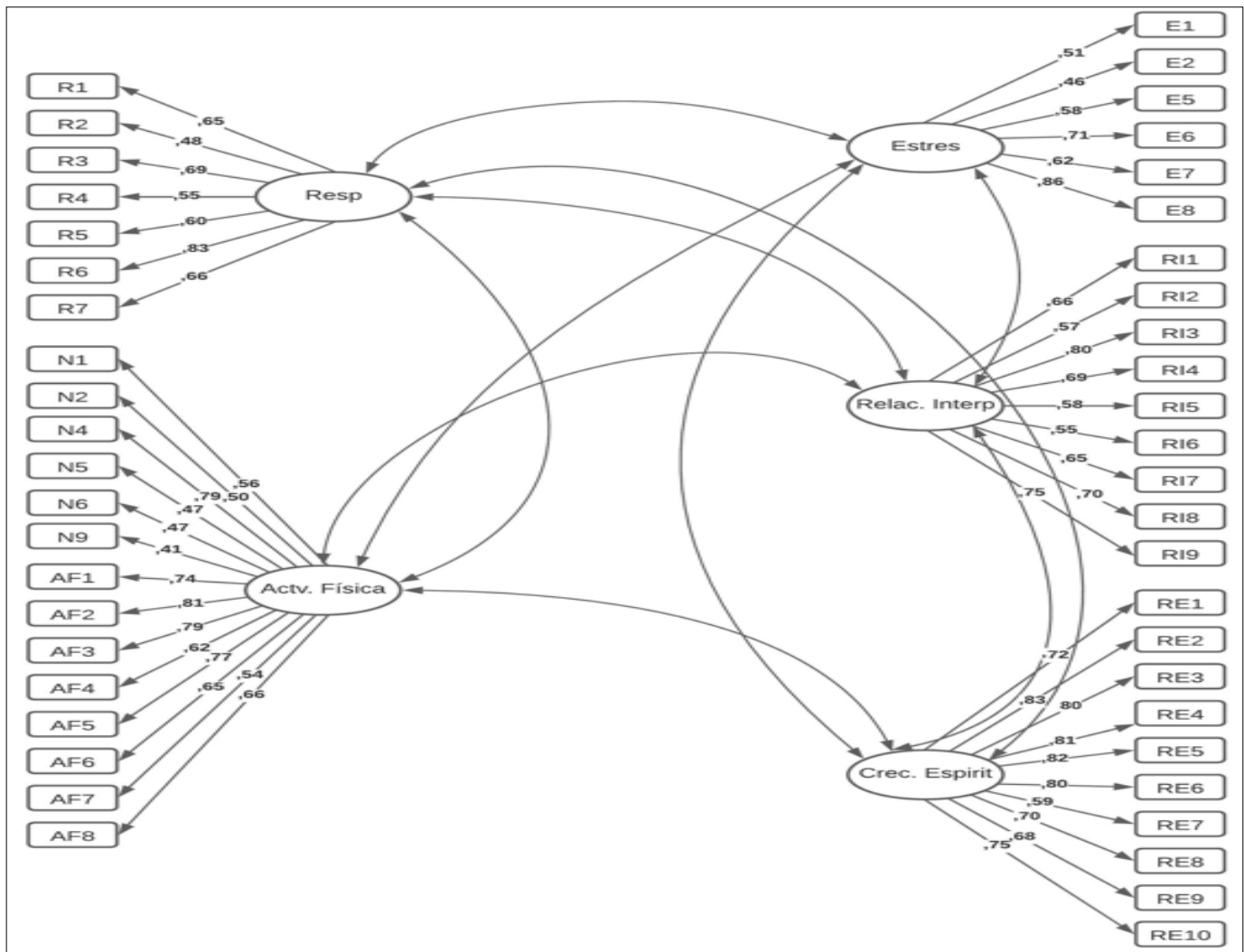* They maintained the same configuration in both models.

Figure 2. Five-factor model.

DISCUSSION

The present study reports that the physical activity and nutrition dimensions of the HPLP-II are merged, reflecting a close relationship. This observation coincides with other studies.[29-31] Difficulty in understanding the nutritional dimension items is likely.

Likewise, a divergence was observed in the physical activity and nutrition behaviors: "Those who eat inadequately do not relate to those who perform physical activity." This finding was contrary to what was observed in other research in Latin America, in which a direct relationship between these two variables was found.[32,33] This could be attributed to the fact that the participants reside in a university citadel where they cover their routes by walking or cycling and have limited use of public transportation. Furthermore, the participants were from other regions of Colombia, which implies the need to cover their nutritional needs with limited resources, which adds to a wide range of high-calorie foods at more affordable costs than healthy eating. Sogari *et al.*[34] suggested that limited time, exposure to high-calorie snacks, high prices of healthy foods, easy access to processed food, and academic stress are predictors of the adoption of unhealthy eating habits.

On the other hand, it has been shown that self-reporting is a significant limitation that affects the results, specifically when it comes to sensitive variables such as physical activity habits and nutritional status. The items of the evaluated instrument do not collect information on the most recent behaviors; this issue is considered with nutritional populations such as the National Nutrition Situation Survey (ENSIN).[35] The ENSISN items control recall bias by limiting the user's response to a 24-hour window before completing the instrument. Other studies propose incorporating objective assessments and not self-reports by the participants since they could overestimate healthy behaviors.[36-38]

Consequently, the present study evaluates physical activity and nutritional status in a single dimension. It is suggested to review the translation and wording of the items by experts (particularly items 3, 7, 8, and 10 of the nutrition dimension in the original version) with the use of some Delphi or modified Apgar-type methodology, as well as ensure the understanding of said items by the respondents. Finally, the questionnaire's psychometric properties show acceptable values; it is grouped into five dimensions, with goodness indicators lower than expected but with internal consistency indicators with high values.

It is advisable to control the application conditions better to reduce the probability of biases associated with understanding the questions or possible environmental distractors. This will produce more consistent results in these dimensions and better adjustment indicators in the total test.

It is concluded that although the psychometric analysis reports adequate indicators of internal consistency and adequate fit indices of the factorial model in most of its parameters, a new study with probabilistic sampling and overcoming the limitations above could report more robust indicators that support the massive application of the HPLP-II in population contexts of Colombia, which in turn allow clinical decision making and public health promotion and prevention.

STATEMENT ABOUT CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

CONTRIBUTION OF THE AUTHORS

AGA performed bibliographic review, methodological design, statistical analysis, writing, and final approval of the manuscript.
KEVE carried out bibliographic review, data collection, writing, and final approval of the manuscript.
MABL performed bibliographic review, data collection, writing, and final approval of the manuscript.

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