

A Predictive Model of Subjective Well-Being Among Medical and Psychology Students

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ABSTRACT

In recent years, the science of subjective well-being (SWB) has grown significantly. However, the variables that have the greatest impact on this phenomenon are still unknown. From Diener's SWB theory, the objective of this cross-sectional research was to analyze the relationships between optimism (OP), gratitude (GR), resilience (RE), self-esteem (SE), family support (FS) and friends support (AS) on SWB. Seven scales were applied to 600 Mexican medical and psychology students. Non-probabilistic sampling was used. Structural equations modeling was used to analyze the data. Through maximum likelihood estimation, the model showed a good data fit and was valid for both groups of students. The results are discussed, within the framework of positive psychology, with regard to their practical implications in university contexts. It is concluded that there exists a direct effect of OP, RE, SE, FS, and AS on SWB in both medical and psychology students.

KEYWORDS: Subjective well-being, life satisfaction, affective balance, positive psychology, university students

ABBREVIATIONS: OP: Optimism; GR: Gratitude; RE: Resilience; SE: Self-Esteem; FS: Family Support; AS: Friends Support; SWB: Subjective Well-Being; ML: Maximum Likelihood; GFI: Goodness-of-Fit Index; AGFI: Adjusted Goodness-of-Fit Index; NFI: Normed Fit Index; NNFI: Non-Normed Fit Index; CFI: Comparative Fit Index; SRMR: Standardized Root Mean Square Residual; RMSEA: Root Mean Square Error of Approximation; PA: Positive Affect; NA: Negative Affect; AB: Affective Balance; U: Unconstrained

INTRODUCTION

SWB refers to the evaluations that people make about their own lives in cognitive and affective terms; it also encompasses the beliefs and emotions that people harbor in relation to leading a good life Diener [1]. Diener [2] characterizes people with high SWB as those who have a predominance of positive evaluations regarding their lives' circumstances, whereas people with low SWB are those who consider most of the factors in their life as harmful or hindering their objectives.

Notwithstanding that humanity has been interested in well-being for a long time, it is until recent decades that SWB has become one of the most important research issues. Indeed, the number of studies on SWB has increased exponentially in recent years, and this development has been due, in part, to the fact that valid and reliable instruments aimed at assessing SWB have been created Armenta [3].

Traditionally, research has focused on the study of negative psychological phenomena, such as stress, anxiety, depression, burnout, among others, and how they negatively affect the physical and mental health of people Park [4], neglecting paying attention to the strengths and positive qualities of the individual, such as resilience, optimism, or gratitude Lent [5]. Nowadays, however, there is a substantial trend towards the study of positive psychological processes (e. g. joy, happiness, altruism, or hope) as well as of those factors that make life worth living (e. g. having a sense of purpose and direction in life, goals, or love).

The concepts and ideas regarding SWB are being increasingly used to address clinical phenomena, assess organizational climate, and improve quality of social life Diener et al. [6]. Furthermore, there exist solid evidence which indicate that SWB is closely related to success in interpersonal relationships Herbers [7], good work

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performance Man [8]; Warr [9], optimal health status Kuykendall [10]; Ngamaba [11] and even a healthy or successful aging Boccardi [12].

Positive psychology offers a relevant approach since it focuses on the study of human strengths and virtues, as well as on the impact that they may have on the lives of people and society Peterson [13]. In Mexico, the study of SWB and positive psychology is still at an initial stage of development Tapia [14]. Nevertheless, a considerable number of researchers in Ibero-America, including Mexican researchers, are adopting the paradigm of positive psychology in their studies.

Importance of Studying SWB

Studies have shown that, in comparison with individuals with lower level of SWB, people with greater level of SWB receive greater social rewards, have better job performance, show better coping skills, have better health, are more cooperative, charitable and prosocial, and tend to be more long-lived Diener [15].

Owing to the multiple benefits associated with SWB, the study of its predictive variables has increased Siedlecki [16]. Vera [17] have pointed out that people with a greater level of positive affect (PA), OP, and well-being have better physical and psychological health. Likewise, individuals who have satisfactory social relationships have reported feeling happier and being more satisfied with their lives when compared to people who lack favorable social relationships Siedlecki et al. [16]. Nevertheless, there are still unresolved questions about which variables or mechanisms are involved in the development of SWB.

Lucas [18] has indicated four reasons why the study of SWB is important: 1) SWB is a topic of interest both for the general public and scientific specialists with regard to seeking the variables that increase it, 2) the study of SWB could open the door to the understanding and identification of the elementary needs of the human beings, 3) the way in which people make judgments and evaluations is another point of interest when studying SWB, and 4) the research on SWB can facilitate the understanding of how affective processes motivate people's actions.

Howell [19] asserted that the study of SWB among university students is receiving more attention from academics in numerous disciplines. SWB is regarded as an important issue in order to both create educational environments that allow acquiring skills that may favor the development of SWB, as well as to promote the development and implementation of intervention programs grounded in positive psychology, aiming at furthering academic success and mental health of students Gilman [20]; Norrish [21]; Shoshani [22]; Proctor [23]. Positive psychology offers a pertinent framework for these goals since it implies going well beyond the disease-centered approach. On the contrary, it involves exploring the positive qualities of individuals and to study the underlying variables that contribute to the development of SWB, thus helping them gain understanding and construct what can be defined as a "good life" Park et al. [4].

On the other hand, Lyubomirsky [24] have pointed out that it is commonly thought that good situations that happen in life lead to SWB; nevertheless, in their meta-analysis of positive affects, they found that the directional path is the reverse, that is, SWB and PA lead to greater academic and professional success, better married life and interpersonal relationships, better mental and physical

health, longevity, and RE. Likewise, Oishi [25] have proposed to take into account the variations caused by culture with respect to the conception and explanation of SWB, since the meaning and importance granted to the SWB undergo changes over time and across different nations.

Variables Associated to SWB

Upon performing a theoretical review, Park et al. [4] point out that there are various strengths of character that influence SWB, such as GR, hope, enthusiasm, curiosity, and love. Indeed, empirical research has demonstrated the influence of several personality variables on SWB, such as GR Datu [26], OP Carver [27], RE Lü [28], and SE Pepping [29], as well as the influence of social support George [30].

The word GR is related to kindness, generosity, the beauty of giving and receiving, or obtaining something for nothing Emmons [31]. Wood [32] define GR as a feature or willingness to be grateful and an orientation towards the perception and appreciation of the positive in life. Similarly, Datu [26] conceptualizes GR as a prosocial and moral affection and disposition and indicates that GR is a positive psychological reaction to an interpersonal benefit which allows people to appreciate positive things and events in their lives and to experience greater levels of SWB. Armenta et al. [3] point out that research has found that activities such as expressing GR or performing acts of kindness can substantially increase SWB.

One of the most studied predictive variables of SWB is OP, also referred as positive thinking Friend [33]. From the theory of interactive personality style, Garcia-Cadena [34] affirm that interactive optimism refers to the ability and willingness of individuals to interact with people in a positive way, so that good things may occur as a result of such interaction. Likewise, OP is also related to life satisfaction (LS), a better mood, greater academic and sports success, better health, and a longer life Peterson [35]. Optimists have greater levels of SWB, and this can be justified by their ability to effectively deal with difficult situations Carver [27]; Garcia-Cadena et al. [36].

Another personality trait that has influence on SWB is RE. Rutter [37] points out that this construct has its origin in the existence of a great diversity of coping responses of people towards all kinds of environmental adversities. Some individuals show better results than others when experiencing adverse situations, which is attributed to their greater level of RE. In turn, living an unfavorable experience and overcoming it helps to increase their resilience when facing other hostile or stressful situations Fletcher [38]. Likewise, Lü et al. [28] consider that RE is a key factor in improving SWB because it increases positive affections while reducing negative ones. RE has also a role in preventing illness or negative behaviors, and in promoting positive results in people's lives. Thus, resilient individuals can maintain their physical and psychological health by cushioning the negative consequences of difficult times.

SE is another variable associated with SWB. Rosenberg [39] defined SE in terms of specific attitudes that are based on the perception of a feeling of worth as a person. A greater level of SE appears when a person has a positive attitude towards himself/herself, perceives he/she is good enough, feels valuable, is respected for what he/she is, does not feel fear of himself/herself nor expects that others to feel fear towards him/her, and does not consider himself/herself superior to others Mruk [40].

SE shows very marked differences depending on the type of society in which it is assessed. Larsen [41] have pointed out that SE is one of the strongest variables in explaining the level of SWB in countries with an individualistic culture. Likewise, the correlation between SE and LS is higher in individualist nations than in collectivist ones. These findings suggest that SE varies between cultures and that it is only one of the determinant elements of LS Suh [42].

Another factor that influences the level of SWB is the social support from family and friends. Family is a primary relationship upon which individuals initially depend to satisfy their needs. Family ties are strong and long-lasting, and family can provide several types of supports to the member in need of it Medellín [43]. According to Gonzalez [44], friendship is a secondary relationship, which is a natural consequence of the process of socialization of individuals. Friends may have a greater importance to individuals depending on their stage of life; nevertheless, in general, the relationships with friends tend to be shorter relationships than family ones. Gülaçti [45] suggests that the fact that a person feels good when receiving social support can positively affect SWB. Indeed, Diener et al. [46] points out that family and interaction groups are important components of SWB in the cognitive section.

In the present study, SWB is conceptualized from Diener's theory [47], whose indicators are affective balance (difference between positive affect and negative affect) and LS. Considering the seven aforementioned variables, it is intended to test their effects upon SWB, since they have not been previously studied in an integrated model. From this approach grounded in positive psychology, the objectives of this study were to test a structural model of SWB, and to verify whether the specified model is invariant across the two types of students composing the sample (psychology and medical students). In this model, OP, GR, RE, SE, FS, and AS directly predict SWB; SWB, as a latent variable, is assessed through affective balance (AB) and LS.

The seven variables are expected to have significant weights upon SWB, with a greater weight of the personality variables (causal dependent relation between internal attributes and individual's SWB) than the variables related to social support (cause dependent relation between others' attributes or external situations and individual's SWB). The goodness of fit of the model is expected to be good model. Likewise, it is expected that the model will be valid both for medical students and psychology students, but not strictly invariant, since those careers have certain similarities and also have differences in curricula, learning and study styles Brimstone [48]. If factorial invariance is achieved, it could be considered as evidence for the validity of the model.

METHODS

Design and Type of Study

This study had a non-experimental cross-sectional design.

Participants

A non-probability sample was collected. The medical students were recruited at two private universities located in Monterrey and Saltillo, Mexico, whereas the psychology students were recruited at a public university located in Monterrey, Mexico.

The sample was composed of 600 students. The medical students comprised 50.2% of the sample (35.2% from Monterrey

and 15% from Saltillo) and the psychology students comprised the remaining 49.8%. The participants' mean age was 20.24 years (SD = 2.56), 95% CI [20.03, 20.44], and ranged from 16 to 52 years; its distribution showed positive skewness, ZSk = 43.74 and marked kurtosis, ZK3 = 210.94.

Instruments

The measurement instruments used in this study were composed of 6-point, Likert-type scales, with three ordered categories for each response pole, so that the response ambiguity that is inherent to a central category was avoided Willits [49].

Brief Interactive Optimism Scale (Garcia-Cadena [34]. BIOS is a self-report scale composed of eight items. It was developed in Mexico. In this original version, its items are rated along a four-point, Likert-type scale. In this study, the items were rated along a six-point, Likert-type scale (from 1 = "Of course not" to 6 = "Yes of course"). The sum of the eight items yields a total score such that a higher score means greater level of optimism. BIOS showed a unidimensional structure and good internal consistency ($\omega = .85$). The composite reliability of this scale, estimated in this study by McDonald's Omega coefficient, was excellent ($\omega = .97$).

Gratitude Questionnaire-6 (GQ-6; McCullough [50]. The Spanish version adapted by Bernabe [51] was used. GQ-6 is a self-report scale composed of six items. In its original version, these items are rated along a seven-point, Likert-type scale. In this study, the items were rated along a six-point, Likert-type scale (from 1 = "strongly disagree" to 6 = "strongly agree"). The sum of the six items yields a total score such that a higher score reflects a greater willingness to be grateful. GQ-6 showed a unidimensional structure and an acceptable internal consistency ($\alpha = .77$). The composite reliability of this scale in this study was acceptable ($\omega = .79$).

10-item Connor-Davidson Resilience Scale (CD-RISC-10; Campbell-Stills [72]. The Spanish version adapted by Daniel-Gonzalez [72] was used. CD-RISC-10 is a self-report scale composed of ten items that are rated along a six-point, Likert-type scale (from 0 = "strongly disagree" to 5 = "strongly agree"). The sum of the ten items yields a total score such that a higher score reflects a greater level of resilience. CD-RISC-10 showed a unidimensional structure and a good internal consistency ($\alpha = .85$). The composite reliability of this scale in this study was good ($\omega = .84$).

Rosemberg Self-Esteem Scale (RSES; Rosenberg [39]. The Spanish version adapted by Gongora [54] was used. RSES is a self-report scale composed of ten items. In its original version these items are rated along a five-point, Likert-type scale. In this study, the items were rated along a six-point, Likert-type scale (from 1 = "strongly disagree" to 6 = "strongly agree"). The sum of the ten items yields a total score such that the higher the score, the greater the level of self-esteem. RSES showed a unidimensional structure and an acceptable internal consistency ($\alpha = .78$). The composite reliability of this scale, estimated in this study by McDonald's Omega coefficient, was excellent ($\omega = .91$).

Social Support from Family and Friends Scale (SFF-R; Gonzalez [44]). SFF-R is a self-report scale composed of 14 items that are rated along a five-point, Likert-type scale. In this study, the items were rated along a six-point, Likert-type scale (from 1 = "strongly disagree" to 6 = "strongly agree"). The sum of the 14 items yields a total score such that the higher the score, the greater the perception of social support from family and friends. SFF-R showed a two-

factor structure: FS ($\alpha = .92$) and AS ($\alpha = .90$). The composite reliability coefficients in this study were excellent for both FS ($\omega = .91$) and AS ($\omega = .90$). Satisfaction with Life Scale (SWLS; Diener [55]). The Spanish version adapted by Vazquez [56] was used. SWLS is a self-report scale composed of five items that are rated along a seven-point, Likert-type scale; in this study, the items were rated along a six-point, Likert-type scale (from 1 = “strongly disagree” to 6 = “strongly agree”). SWLS showed a unidimensional structure good internal consistency, $\alpha = .88$ Diener et al. [57]. The composite reliability of this scale in this study was good ($\omega = .88$).

Scale of Positive and Negative Experience (SPANE; Diener et al. [57]). The Spanish version adapted by Daniel-Gonzalez [73] was used. SPANE is a self-report scale composed of twelve items that are rated along a five-point, Likert-type scale. In this study, the items were rated along a six-point, Likert-type scale (from 1 = “never” to 6 = “always”). This scale showed a two-factor structure: PA ($\alpha = .87$) and NA ($\alpha = .81$). The composite reliability of this scale in this study was excellent for PA ($\omega = .93$) and good for NA ($\omega = .87$).

Procedure

Before the administration of the questionnaire, the approval from authorities of each university was obtained. The participation in this study was completely voluntary, and all respondents provided informed consent. After explaining the objective of this study and giving the pertinent instructions, the questionnaires were applied. This study was approved in its technical and ethical aspects by the competent authorities of the School of Psychology of the Universidad Autonoma de Nuevo Leon. The authors of this research and/or their academic collaborators gave instructions to complete the questionnaire and stayed in the classroom during its administration so as to clarify any doubts that might arise, trying not to influence the responses of the participants. Data collection was carried out from January through December 2018. No identification data were asked for to the participants in order to assure their anonymity, and the confidentiality of the information provided through this questionnaire was guaranteed. The ethical code from the American Psychological Association APA [58] was followed during the design and implementation of this research.

Data Analysis

The optimization of the discrepancy function was performed through the Maximum Likelihood (ML) method. In the multi-group

analysis, nested models with cumulative constraints were defined. The Z-test was used in order to test the hypothesis of equivalence between the parameters of both samples in each nested model. The goodness of fit in both the one-group analysis and in the multi-group analysis was assessed through seven indices: relative chi-square (χ^2/df), Jöreskog-Sörbom's Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Bentler-Bonett's Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), Bentler's Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). The criteria to establish the existence of a close goodness of fit were: $\chi^2/df \leq 2$; GFI, NFI, NNFI, and CFI $\geq .95$; AGFI $\geq .90$; as well as SRMR and RMSEA $\leq .05$. The criteria to establish an adequate goodness of fit were: $\chi^2/df \leq 3$; GFI, NFI, NNFI, and CFI $\geq .90$; AGFI $\geq .85$; SRMR $\leq .10$; and RMSEA $\leq .08$. The equivalence in goodness of fit between two models was verified through the Chi-square difference test, the differential relative chi square ($\Delta \chi^2/\Delta df$), and the differences in the indices GFI, NFI, AGFI, and CFI. p values $> .05$ for the null hypothesis of equivalence ($H_0: \Delta \chi^2 = 0$), $\Delta \chi^2/\Delta df < 2$, ΔGFI , ΔNFI , $\Delta AGFI$, and $\Delta CFI \leq .01$ were considered as evidence of equivalence in goodness of fit Byrne [59].

Two-tailed Kolmogorov-Smirnov test with Lilliefors correction was used to test univariate normality. Mardia's multivariate kurtosis coefficient was used to test the fulfillment of multivariate normality assumption; a standardized value lower than 10 is considered as adequate when using ML estimation Kline [60]. Due to the multivariate normal assumption was not fulfilled, the bias-corrected percentile bootstrap method was performed with 2000 bootstrap samples. This latter procedure is a non-parametric technique through which random samples were generated in order to estimate the standard errors and test the significance of the parameters of the model when this assumption is rejected Byrne [59]; Kline [60]. All statistical analyses were computed with SPSS v24 and AMOS v24. Significance level is fixed at .05.

RESULTS

Descriptive Statistics

Table 1 shows the descriptive statistics for the total sample, including mean, standard deviation, minimum and maximum values. The null hypothesis of normal distribution was rejected through Kolmogorov-Smirnov normality test with Lilliefors correction for the ten scales.

Table 1: Descriptive statistics of the study variables (N = 600).

Scales	M	SD	Min	Max	KSL
OP	13.73	6.973	4	24	0.153***
GR	19.86	2.707	10	24	0.177***
RE	36.08	5.745	10	50	0.110***
SE	45.24	7.523	18	60	0.133***
FS	18.98	5.432	4	24	0.178***
AS	19.02	4.819	4	24	0.150***
PA	25.67	5.44	7	36	0.087***
NA	16.56	5.088	6	36	0.094***
AB	9.11	9.472	-23	30	0.066***
LS	22.08	4.386	5	30	0.153***

Note: Scales: OP = optimism, GR = gratitude, RE = resilience, SE = self-esteem, FS = social family support, AS = social friends support, PA= positive affect, NA, negative affect, AB = affective balance, and LS = life satisfaction. Statistics: M = arithmetic mean, SD = Standard deviation, Min =minimum, Max = maximum, KSL = Statistic value in Kolmogorov-Smirnov normality test with Lilliefors correction, and probability value for a two-tailed test: *** $p > .001$

Unigroup Analysis for Model for SWB

A model for SWB was specified taking into account the components theorized by Diener et al. [55]. The standardized

structural weights and the proportions of explained variance obtained in the unigroup analysis are shown in Figure 1. Estimates and significance tests of its parameters are shown in Table 2.

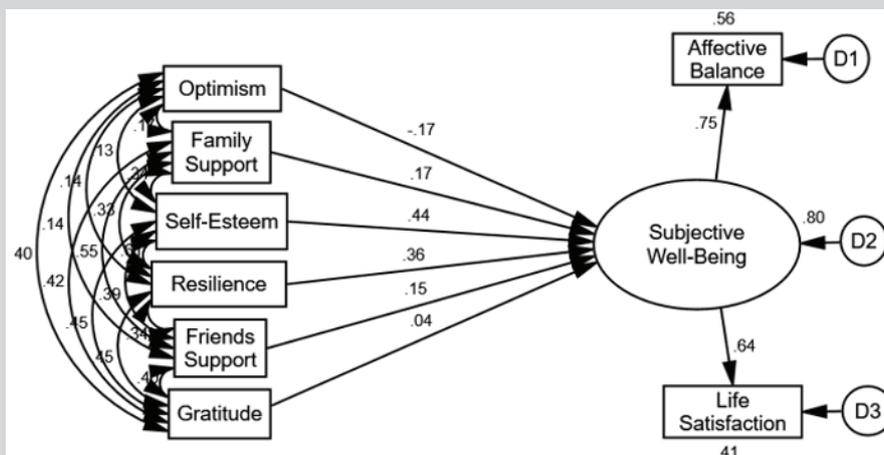


Figure 1: Standardized solution of the hypothesized model of SWB.

Table 2: Comparison of the parameters of nested models between the samples composed of psychology and medical students.

Parameters	Hypothesized Model		Modified Model				
	Standardized Point Estimation in One-Group Analysis	Standardized Point Estimation in One-Group Analysis	Z-test for Comparing Each Parameter Between Nested Models in the Multi-Group Analysis				
			UC	MW	SW	SC	SR
SWB → BA	.746***	.800***	Fixed	Fixed	Fixed	Fixed	Fixed
SWB → LS	.643***	.509***	-1.055				
OP → SWB	-.167***	-.182***	1.518	1.649			
AS → SWB	.174***	.167***	2.621**	2.402*			
SE → SWB	.441***	.462***	-0.395	-0.639			
RE → SWB	.363***	.368***	-1.149	-1.308			
AS → SWB	.151***	.158***	2.387*	2.328*			
GR → SWB	.041ns	not specified					
GR → LS	not specified	.285***	-1.24	-1.262			
GR ↔ AS	.400***	.400***	1.883	1.883	1.883		
GR ↔ RE	.453***	.453***	2.697**	2.697**	2.697**		
GR ↔ SE	.445***	.445***	2.86**	2.86**	2.86**		
GR ↔ FS	.424***	.424***	2.578**	2.578**	2.578**		
GR ↔ OP	.497***	.497***	6.342***	6.342***	6.342***		
AS ↔ RE	.342***	.342***	0.515	0.515	0.515		
AS ↔ SE	.394***	.394***	2.303*	2.303*	2.303*		
AS ↔ FS	.553***	.553***	-0.245	-0.245	-0.245		
AS ↔ OP	.138***	.138***	4.387***	4.387***	4.387***		
RE ↔ SE	.614***	.614***	4.521***	4.521***	4.521***		
RE ↔ FS	.328***	.328***	-0.295	-0.295	-0.295		
RE ↔ OP	.143**	.143**	4.589***	4.589***	4.589***		
SE ↔ FS	.344***	.344***	1.087	1.087	1.087		
SE ↔ OP	.128***	.128***	4.691***	4.691***	4.691***		
FS ↔ OP	.167***	.167***	4.803***	4.803***	4.803***		
σ ² RE	32.950***	32.950***	4.752***	4.752***	4.752***		
σ ² OP	48.546***	48.546***	1.676	1.676	1.676		
σ ² GR	7.317***	7.317***	4.533***	4.533***	4.533***		

σ^2_{AS}	23.185***	23.185***	0.647	0.647	0.647		
σ^2_{SE}	56.495***	56.495***	6.99***	6.99***	6.99***		
σ^2_{FS}	29.456***	29.456***	-2.404*	-2.404*	-2.404*		
$\sigma^2_{RES_SWB}$	9.911***	16.175***	2.056*	1.819	1.703	1.703	
$\sigma^2_{RES_AB}$	39.742**	32.296***	0.518	0.96	0.994	0.994	2.767**
$\sigma^2_{RES_LS}$	11.265***	10.899***	0.393	0.175	0.121	0.121	0.435

Note: OP = Optimism, FS = Family Support, SE = Self-Esteem, RE = Resilience, AS = Friends Support, GR = Gratitude, AB = Affective balance, LS = Life Satisfaction, SWB = Subjective Well-Being. UC = Un-Constrained model, MW = Model constrained in measurement weights, SW = Model constrained in structural weights, SC = model constrained in structural variances and covariances, SR = model constrained in variance of structural residual. Parameters: → structural weight, ↔ structural covariance, σ^2 = variance, RES = residual. Two-tailed Z test: * $p < .05$, ** $p < .01$ ***, $p < .001$.

Mardia's multivariate kurtosis coefficient was 19.47 and its standardized value was 18.85, which evidence a non-fulfillment of the multivariate normality assumption. Therefore, the bootstrap procedure was used for the interval estimates of the parameters. The solution was admissible. SE ($\beta = .44, p < .001$) and RE ($\beta = .35, p < .001$) had the direct effects (β) with the greatest weights on SWB. FS ($\beta = .15, p < .001$) and AS ($\beta = .14, p < .001$) had the direct effects with smallest weights. Nevertheless, GR did not show a significant direct effect upon SWB ($\beta = .04, p = .370$). The model showed good fit for four indices (GFI = .979, NFI = .967, CFI = .969, and SRMR = .040), but bad for four indices ($\chi^2/df = 10.970$, AGFI = .846, NNFI = .827, and RMSEA = .129, 90% CI [.100, .161]). When reviewing modification indices, the effect of GR on LS appears with a high value (MI = 24.01). It was considered that this path could be interpreted in theoretical terms, and thus the effect of GR on SWB

was eliminated and its effect on LS was specified.

In the revised model (Figure 2); (Table 2), all parameters were significant. GR did have a small effect on LS ($\beta = .26, p < .001$). In the measurement model of SWB, the direct effect of SWB was very large on AB ($\beta = .80, p < .001$) and was large on LS ($\beta = .52, p < .001$). The model comprising six correlated exogenous variables explained 72% of the variance of the SWB, 64% of the variance of AB and 44% of the variance of LS. Seven of eight fit indices showed a good fit: GFI = .995, AGFI = .964, NFI = .993, NNFI = .976, CFI = .996, RMSEA = .048, 90% CI [.012, .084], and SRMR = .016), and relative Chi-square showed an acceptable fit ($\chi^2/df = 2.398$). The goodness of fit of the revised model improved with respect to the hypothesized model ($\Delta CFI = .026, \Delta NFI = .026$, and $\Delta NNFI = .149 > .01$, and $|\Delta RMSEA| = .081 < .05$).

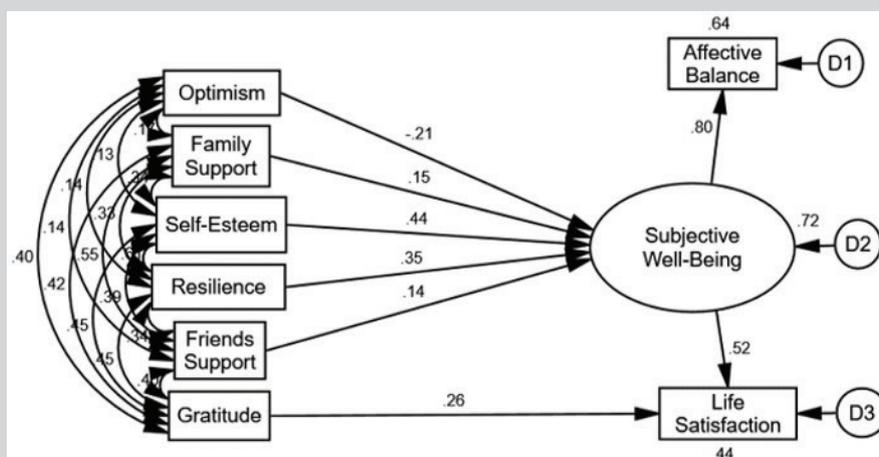


Figure 2: Standardized solution of the revised model of SWB.

Revised Model Invariance of SWB Between Both Student Groups

Five nested models with cumulative constraints were specified: unconstrained (U), constraints in Measurement Weights (MW), constraints in Structural Weights (SW), constraints in structural variances-covariances (SC), and constraints in the variances of Measurement Residuals (MR). All parameters were significant in both groups in the five nested models. When comparing the parameters of each nested model between both groups, there were significant differences. In the unconstrained model (U) and in the model with constraints in Measurement Weights (MW), two out of the five structural weights were differential. FS had a higher weight upon SWB among psychology students and AS had a higher weight upon SWB among medical students.

In the unconstrained model (U), the variance of the residuals of SWB was lower among psychology students, but in the other models this parameter was equivalent between both student groups. The variances of the measurement residuals were equivalent between both student groups in the five models, with the exception of the variance of the residuals of AB in the model with constraints in structural variances-covariances (SC), whose variance was higher among medical students (Table 2).

The goodness of fit ranged from good (GFI, AGFI, NFI, CFI, RSMSEA, and SRMR) to acceptable (χ^2/df and NNFI) in unconstrained model (U) as well as in the models with constraints in measurement weights (MW) and structural weights (SW). The goodness of fit was statistically equivalent between the first two models (U and MW) both by the test of the difference of the Chi-square statistics ($\Delta \chi^2[1] = 1.07, p = .302$) and by the indices $\Delta NFI, \Delta NNFI$, and $\Delta CFI (< .01)$.

When comparing the last two models (that is, MW and SW), the equivalence of goodness of fit was maintained with a probability higher than .01 by the test of the difference of chi-square statistics ($\Delta\chi^2[7] = 16.85, p = .018$) and by the indices $\Delta NFI, \Delta NNNFI,$ and ΔCFI

higher than .01. Nevertheless, poor goodness-of-fit values had prominence in the other three nested models. The goodness of fit worsened significantly with the increase in constraints (Table 3).

Table 3: Goodness-of-fit indices of the six nested models in constraints in the multigroup factor analysis.

Fit		Nested models					
Indices	UC	MW	SW	SC	SR	MR	
χ^2/df	2.889	2.724	2.691	6.234	6.147	6.045	
GFI	0.988	0.988	0.982	0.918	0.917	0.914	
AGFI	0.916	0.921	0.923	0.844	0.847	0.849	
NFI	0.983	0.982	0.973	0.859	0.857	0.853	
NNFI	0.935	0.941	0.942	0.82	0.823	0.826	
CFI	0.988	0.988	0.982	0.878	0.877	0.873	
RMSEA	0.056	0.054	0.053	0.094	0.093	0.092	
[90% CI]	[.033, .081]	[.031, .077]	[.035, .072]	[.082, .105]	[.082, .104]	[.081, .103]	
p-Close	0.3	0.36	0.361	<.001	<.001	<.001	
SRMR	0.028	0.029	0.039	0.113	0.114	0.113	
$\Delta\chi^2$	UR		1.066	16.846*	207.995***	210.854***	218.957***
	MW			15.781*	206.929***	209.788***	217.891***
	SW				191.148***	194.007***	202.111***
	SC					2.859	10.963*
	SR						8.103*
ΔNFI	UR		0.006	0.007	0.115	0.112	0.109
	MW			0.001	0.121	0.118	0.114
	SW				0.122	0.119	0.116
	SC					0.003	0.007
	SR						0.004
$\Delta NNNFI$	UR		0.006	0.007	0.115	0.112	0.109
	MW			0.001	0.121	0.118	0.114
	SW				0.122	0.119	0.116
	SC					0.003	0.007
	SR						0.004
ΔCFI	UR		0	0.006	0.11	0.111	0.115
	MW			0.006	0.11	0.111	0.115
	SW				0.104	0.105	0.109
	SC					0.001	0.005
	SR						0.004

Note: UC = Un-Constrained model, MW = Model constrained in measurement weights, SW = Model constrained in structural weights, SC = model constrained in structural variances and covariances, SR = model constrained in variance of structural residuals, MS = model constrained in variance of measurement residuals.

DISCUSSION

The first objective of this study was to specify and test a structural model on SWB derived from the theory of Diener et al. [46], which focused on LS as well as in the AB between PA and NA. The second objective was to verify whether the specified model is invariant across psychology and medical students.

A novelty introduced in this study is to have used BA as an indicator of SWB, since AB is usually divided into PA and NA Busseri [61]. We proceeded in this way for theoretical reasons. Bradburn [62] was one of the first authors that pointed out that happiness is essentially related to the balance between PA and NA, discomfort has to do with the imbalance between PA and NA, and affective

pathology implies a great imbalance between those affective states. Thus, from that standpoint, mania is the result of an imbalance towards inordinate PA, whereas depression is due to excessive NA Gruber [63]; American Psychiatry Association [58]. This aspect is clearly measured by AB, which results from the difference between the scores of PA and NA; its sign (positive or negative) reflects the dominant AB, and in its magnitude the degree of the affective imbalance Diener et al. [47].

In the specified structural model, four personality variables (OP, GR, RE, and SE) and two psychosocial variables (FS and AS) were considered to predict the SWB. Taking into account the review of the literature, these six variables are the most studied with regard

to SWB Garcia-Cadena et al. [34]; Martinez-Marti [53]; Datu [26], but they had not been previously assembled in order to integrate a structural model. The explained variance for SWB attained with this model was equal to 72%, which represents a very large effect size Kline [60]. These results showed the important role played by SE and RE, without diminish the importance of OP, GR, FS, and AS.

The importance of SE upon SWB had been already pointed out in several publications by Diener et al. [57], who described that SE had a stronger relationship with the SWB in countries with individualistic cultures than in countries with collectivist cultures. In individualistic cultures, the valuation of oneself is very important, whereas in collectivist cultures the opinion of the family nucleus is preponderant, and SE is not put in the foreground. RE has been widely recognized as a variable that helps improve SWB by increasing the balance between PA and NA (Lü [28]). Resilient people have adaptation tools to face and overcome stressful or adverse situations in life; likewise, they also feel good about themselves and have a greater level of SWB Arrogante [64]. Similarly, resilience is considered as a key factor for SWB and academic success, and consequently it can be considered as a process of positive adaptation within the context of adversity or stressful life events Vizoso [65].

OP was expected to be a positive predictor of SWB, that is, that a greater level of OP would predict a greater level of SWB Duy [66]. However, against this expectation, the model showed that OP had a negative relation with the SWB. How could one explain that the more optimistic people in the sample were experiencing lower level of SWB? One possible answer is that optimism is being used as a coping strategy in the face of an imbalance towards NA and lower level of LS. Under this hypothesis, OP, as a cognitive state or processing style, can be increased when coping a situation of predominance of NA and decrease of LS. An optimistic explanatory style consisting in attributing adverse events to something or someone else could fit this hypothesis Vázquez [56]. Precisely, other studies conducted with university students have revealed that OP has a protective role against several pathologic conditions, such as academic burnout Shankland et al. [67], post-traumatic stress disorder Ai [68], and suicide Chang et al. [69]. OP could be an antecedent personality trait that promotes well-being Garcia-Cadena et al. [34] or a contingent state variable to face the loss of SWB Carver [27], as the present data and other studies Shankland et al. [67]; Chang et al. [69]; Ai et al. [68] have revealed.

The social support provided by family and friends has been described as fundamental for the development of SWB in several studies George [30]; North [70]; Lyubomirsky et al. [24]; Diener et al. [46]. The role of these variables can be understood, since people with better social relationships are more easily able to get support when they need it. In turn, having confidence in family or friends generates a comforting feeling, which increases SWB Siedlecki et al. [16]. However, it is important to note that, depending on the type of sociocultural context, family and friends' support may have lower or greater impact upon SWB Brannan [71]. For instance, medical students spend a lot of time with their classmates and friends, since their career demand to work night shifts and to have extensive study days. On the other hand, psychology students seem to have a closer relationship with their nuclear family, and this could be related to having an academic curriculum that allows them to enjoy more time at home. Lonka [72] have pointed out that epistemological differences, learning styles, and study methods could also explain the main differences between medical students and psychology students. GR had a direct effect upon the LS. Wood

et al. [32] pointed out that gratitude leads to SWB and also that the most grateful people have lower levels of stress and depression. In addition, GR helps improve mental health or prevent mental illness. In clinical trials, it was found that the practice of GR can have substantial and lasting positive effects on a person's life. Likewise, GR can promote SWB through prosocial behavior Emmons [31].

The second objective was to verify whether the specified model is invariant across psychology and medical students. Acceptable invariance properties were observed in the unconstrained model as well as in the models with constraints in measurement weights and structural weights. Although two structural weights were differential, the goodness of fit was equivalent between these models and goodness-of-fit indices considered as good prevailed. Nevertheless, the model with constraints in all parameters showed a poor fit and was significantly worse than the other four nested models. Therefore, there is no strict invariance, but it is possible to assert that the model is valid for both groups of students. Considering that LS is the cognitive component of SWB, GR in this model had greater validity for both student groups, being GR a more cognitive than affective aspect. The conceptualization of GR as a more cognitive than affective aspect has been pointed out previously Emmons [31].

The first limitation of this study is the use of a non-probability sampling method, so that the conclusions that are derived from the present data should be taken with due caution and considered as circumscribed to psychology students and medical students. Both student groups were studying in northeastern Mexico, and the difference between them was that psychology students were studying at a public university and medical students were studying at a private university. A second limitation is the non-experimental cross-sectional design, so that inferences cannot be made in terms of causation [73-80].

CONCLUSION

In conclusion, it was found a structural model with good goodness of fit and valid for both student groups, although without strict factorial invariance. The predictive relations of SWB in the model suggest avenues for the design of positive university environments, emphasizing the importance of cognitive aspects (OP and GR), personality aspects (SE and RE), and social support (FS and AS). The design of interventions addressing these variables would help students to develop strategies to effectively face the adverse or stressful situations that they might have in their lives.

It is suggested to verify, in future studies, the invariance of the model across sexes, as well as between student groups studying other careers or studying the same career in public and private universities. Likewise, notwithstanding that self-report scales were used to measure SWB in this study, objective measurement of SWB, such as neuroimaging methods for assessing happiness Matsunaga et al. [69], could be considered in future research.

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional

research committee, in accordance with American Psychological Association [58] ethical standards, and with the 1964 Helsinki

declaration and its later amendments. Informed consent was obtained for all participants.

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