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Torres-Marin, J

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**Competitive Latent Structures for the Comic Style Markers: Developing a Psychometrically Sound Short Version Using Spanish and US American Samples**

Jorge Torres-Marín<sup>1,2</sup>, Ginés Navarro-Carrillo<sup>3</sup>, Mariela Bustos-Ortega<sup>1</sup>, Sonja Heintz<sup>4,5</sup> and Hugo Carretero-Dios<sup>1</sup>

<sup>1</sup>Department of Research Methods in Behavioral Sciences, University of Granada, Granada, Spain;

<sup>2</sup>Department of Social Psychology and Quantitative Psychology, University of Barcelona, Barcelona, Spain;

<sup>3</sup>Department of Psychology, University of Jaén, Jaén, Spain;

<sup>4</sup>School of Psychology, Faculty of Health, University of Plymouth, Plymouth, United Kingdom;

<sup>5</sup>Department of Psychology, University of Zurich, Zurich, Switzerland.

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## **Abstract**

The Comic Style Markers (CSM) is a questionnaire that allows a fine-grained description of how people differ in the way they display humor in their daily lives. It includes 48 statements capturing eight interrelated, yet distinct comic styles: fun, irony, wit, sarcasm, benevolent humor, satire, nonsense humor, and cynicism. Despite the independent conceptual roots of these humorous domains, the analysis of the CSM scales' latent structure shows that their empirical distinction needs to be improved. Using the information derived from a competitive latent approach, including confirmatory factor analysis, bifactor analysis, and exploratory structural equation modeling, we proposed and validated a shorter 24-item version of the CSM in a large sample of 925 Spanish individuals (SP-CSM-24). This scale-refinement improved the psychometric differentiation of the eight comic styles without undermining the good internal consistency and the temporal stability of the CSM scores. Strong invariance was held for gender and age groups, and partial scalar invariance for countries also emerged using a sample of 318 U.S. American adults. Structural equation modeling also corroborated a convincing test-criterion validity for the SP-CSM-24, with dispositional expressions of benevolent humor (positively) and cynicism (negatively) outperforming other comic styles in accounting for individuals' well-being.

*Keywords:* Comic Styles; Latent Structure; Structural Equation Modeling; Measurement Invariance; Well-being.

## 1 Introduction

In 2018, Willibald Ruch, Sonja Heintz and colleagues proposed and empirically validated the Comic Style Markers (CSM), a personality instrument assessing the way people display humor in their daily lives. This instrument subsumes 48 statements tapping into eight intercorrelated, yet distinct, comic styles: fun, irony, wit, sarcasm, benevolent humor, corrective humor or satire, nonsense humor, and cynicism.

Despite the well-established conceptual foundations of the CSM, certain empirical attributes of this measurement require further clarification. For instance, whereas the eight comic styles differ in their unique etiologies and only moderate overlaps between them are theorized (Heintz & Ruch, 2019), there are inconclusive results regarding the most psychometrically sound latent structure of the CSM. Ruch, Heintz and colleagues (2018) obtained preliminary support for a latent structure with eight correlated factors in their seminal study. However, later psychometric works have opted for alternative representations, such as a bifactor solution (Moreira & Inman, 2021) or isolated unidimensional solutions for each comic style (Dionigi et al., 2022). These discrepancies should be addressed, as an ambiguous factorial structure could compromise our conceptual understanding of the *pure or more specific* aspects assessed by each comic style and could even bias their results in terms of associations and predictions.

Furthermore, as any new taxonomy and instrument of personality, the CSM needs to be further examined across different *cultural contexts* to prove its value in describing human humoristic behavior. To date, to the best of our knowledge, the psychometric properties of the CSM has been exhaustively tested in English- and German- (Ruch et al., 2018), Portuguese- (Moreira & Inman, 2021), and Italian-speaking populations (Dionigi et al., 2022). Here we offer the psychometric validation

of the Spanish-version of the CSM (hereafter *SP-CSM*). Although the CSM has already been administered in a few studies conducted with Chilean (e.g., Mendiburo-Seguel & Heintz, 2020) and Spanish (Torres-Marín et al., 2022) samples, these investigations were not aimed to assess the psychometric quality of this instrument in an in-depth way.

To conduct the validation process comprehensively, we examined a range of item-level competitive latent models (i.e., Confirmatory Factor Analysis [CFA], bifactor analysis, and Exploratory Structural Equation Modeling [ESEM]) to shed light on the most accurate representation of the constructs of the CSM. Moreover, following Neumann and colleagues' (2021) work, we used the parametric information provided by these models to propose a scale-refinement that enhances the empirical independence of the eight comic styles. A shorter and psychometrically sound version of the CSM can facilitate its inclusion in surveys with multiple measures, reduce cost and participants' fatigue and, ultimately, promote the investigation of individual differences in humor (Coelho et al., 2018; Rammstedt & Beierlein, 2014).

### **1.1 Construct Validity of the CSM**

*Theoretical roots of the CSM.* As mentioned, the CSM allows for a fine-grained classification of how people habitually use humor. Unlike other theoretical humor-based models (see Martin et al., 2003), the CSM domains represent lower-level categories describing narrower styles referring to humor-related thoughts, emotions, and behaviors (Heintz & Ruch, 2019). Comic styles can be divided according to their social nature in “lighter” or “darker” tendencies. The lighter comic styles, which are conceptually more good-natured and socially acceptable, subsume benevolent humor, fun, nonsense humor, and wit. Conversely, the darker, or mockery-related, comic styles are more socially offensive as they can be used to hurt other people's feelings or convictions. It

includes cynicism and sarcasm as core elements, along with satire and, to a lesser extent, irony (Ruch et al., 2018).

The same authors operationalized the lighter comic styles as follows: Those high in *benevolent humor* are able to maintain a benevolent, yet realistic humorous perspective on the incongruities of life and the defects of the human condition. Those high in *fun* seek to generate a good atmosphere by means of making harmless jokes and clowning around. Scoring high in *nonsense humor* means that the individuals derive amusement from the illogical side of things and find absurdities the funniest. Finally, *witty* individuals describe themselves as people whose cunning and intelligence make them capable of creating hilarious non-obvious combinations of ideas or thoughts.

Regarding the darker comic styles, those high in *cynicism* tend to make fun of commonly recognized social norms or moral conventions, since they consider these manifestations as ridiculous. Having greater levels of *sarcasm* relates to the use of humor to hurt others and to harshly denounce the corrupt side of our reality. High scorers in *satire* share with sarcastic and cynical individuals the mockery and ridicule of all that is wrong in the world (e.g., bad habits, injustices), but combined with attempts of improving and correcting others. Finally, higher levels of *irony* describe people who deploy humor to denote an in-group intellectual superiority by sharing funny things not understood by outsiders.

Unsurprisingly, the traits of the separate constellations of the lighter and darker styles share a moderate degree of common variance, with the strongest overlaps observed for the cynicism-sarcasm dyad ( $r_s \approx .60$ ; Heintz & Ruch, 2019; Ruch et al., 2018). These commonalities, however, appear to be insufficient to overshadow the independent theoretical roots of each one of these comic styles.

*On the dimensionality of the CSM.* A central requirement to consider the CSM a psychometrically sound measurement is to demonstrate that it yields a clear and robust factor structure across all the populations and cultures in which it is administered. Ruch, Heintz, et al. (2018) extensively addressed the dimensionality of the CSM in their seminal study. Using item-level CFA, they found the structure with eight correlated factors to be an appropriate model to account for latent representation of the CSM in English- and German-speaking samples. They also found preliminary evidence of the existence of two hierarchical factors (i.e., lighter vs. darker comic styles) using a scale-level principal component analysis.

Subsequent psychometric studies of different translations of the CSM have chosen alternative approaches when exploring the structure of this instrument. Dionigi et al. (2022) investigated the Italian version of the CSM and found that its domains fit well when they are interpreted as unidimensional scales. However, this analytical approach has evident shortcomings, since it prevents testing the latent correlations between the eight comic styles and their possible overlaps (e.g., items cross-loadings in non-trivial ways). More recently, Moreira and Inman (2021) reported that the participants' responses to the Portuguese form of the CSM can be better accounted for using a bifactor solution, which bifurcates the CSM item-covariances in a general humoristic factor and eight specific factors that isolate unique variance related to each comic style.

The observed variability across these studies suggests that the factorial validity of the CSM requires further examination. Inconsistencies in dimensionality may negatively affect the manifest and latent composite scores and bias their psychometric properties, such as reliability or test-criterion validity (Morean et al., 2014). Hence, our research tested all these item-level latent models in a different country (Spain) to

pinpoint which one offers a more accurate description of the CSM constructs. In addition, we incorporated the ESEM approach. This technique allows modeling the CSM as an eight-dimensional measure while acknowledging the presence of possible cross-loading between the CSM items (Marsh et al., 2014; van Zyl & ten Klooster, 2022). This seems to be particularly relevant given the reasonable overlap between certain comic styles, such as sarcasm and cynicism (Heintz & Ruch, 2019; Moreira & Inman, 2021; Ruch et al., 2018). Moreover, the ESEM solution allows us to identify markers of the SP-CSM that might generate greater ambiguity (i.e., high cross-loading) regarding factor interpretation and that may therefore hinder the isolation of unique associations of each comic style (Neumann et al., 2021).

***CSM and external correlates: Well-being.*** Theoretically consistent correlates of the CSM with external criteria have been shown in several investigations. These works have established a coherent position of the CSM in relation to sociodemographic characteristics (Mendiburo-Seguel & Heintz, 2020), broad personality taxonomies, such as the Five-Factor Model (Dionigi et al., 2022; Ruch, Heintz, et al., 2018) and Eysenck's PEN model (Ruch, Wagner, et al., 2018), and narrower personality models, such as character strengths (Ruch, Heintz, et al., 2018), the Dark Tetrad (Torres-Marín et al., 2022), humor styles (Heintz & Ruch, 2019), the temperamental basis of the sense of humor (Lau et al., 2022), and expressions of the non-linear interactions between the emotional and socio-cognitive dimensions of Cloninger's psychobiological model of personality (Moreira et al., 2022).

Importantly for our research interests, the CSM has also been coherently associated with diverse well-being indicators. This is particularly relevant as the study of humor and well-being constitutes one of the most prolific strand of research within the psychology of humor, with direct (i.e., maintaining a humorous perspective) and



indirect (i.e., favoring social bonds) ways in which humor can favor the individuals' well-being (e.g., Martin et al., 2003).

At a conceptual level, one may argue that the engagement in more benign comic styles would have more positive links to well-being either by acting as reappraisal strategies (i.e., adopting the humorous view of adversity captured by benevolent humor) or social facilitators (i.e., making funny or witty comments: Ruch, Heintz, et al., 2018). Instead, mockery-related comic styles, like other socially offensive humor domains (Martin et al., 2003), might reflect a poorer adjustment and well-being, especially in the case of sarcasm and cynicism (Heintz & Ruch, 2019). These postulates have received reasonable empirical support. In a cross-cultural investigation with samples from 25 countries, Heintz et al. (2020) found a modest (see Gignac & Szodorai, 2016) but consistent positive association between benevolent humor and life satisfaction ( $r_s \approx .17$ ), whereas satire seemed to be unrelated to well-being ( $r_s \approx -.03$ ). This study, however, only included these two comic styles, which offered a limited view on the CSM-well-being link.

Ruch, Wagner, et al. (2018) administered the CSM and observed modest but significant associations of positive affect and high life satisfaction with benevolent humor ( $r_s = .36/.26$ ), fun ( $r_s = .21/.27$ ), and wit ( $r_s = .21/.36$ ), while cynicism showed the opposite associations ( $r_s = -.16/-.15$ ). Additionally, these authors tested whether these associations could be accounted for by the overlapping variance between the CSM and Eysenck's PEN traits. They found that the CSM constructs had incremental validity over these broad personality traits in predicting well-being. Specifically, benevolent humor was uniquely related to greater positive affective experiences, and cynicism to lower life satisfaction. Aligning with these findings, Mendiburo-Seguel and Heintz (2019) reported that individuals' happiness levels showed positive associations with

benevolent humor ( $r = .22$ ), fun ( $r = .17$ ), and wit ( $r = .25$ ), along with a negative relationship with cynicism ( $r = -.10$ ).

Altogether, research suggests that benevolent humor (positively) and cynicism (negatively) are the most predictive CSM dimensions of individual differences in well-being, especially when controlling for the communalities between the comic styles. However, this should be endorsed with successive replications of these findings and with an extension toward different well-being indicators (e.g., loneliness or depression). Adding other indicators of well-being would make it possible to test whether other comic styles may be more relevant for the prediction of specific aspects of individuals' positive or negative perception of their own life. For instance, the theoretical roots of wit, fun, irony or sarcasm suggest that these comic styles could be somehow related to the loneliness perceived by individuals in their daily lives.

***Overview of this research.*** The overarching aim of this investigation was to identify the factorial structure that best accounts for participants' responses to the CSM in order to provide a rigorous psychometric validation of this instrument in Spanish samples. Beyond this, we sought to develop a shorter and psychometrically sound version of the CSM that facilitates the empirical differentiation of the eight comic styles. As outlined, the communalities between the comic styles may lead us to misconstrue their nature and their true associations. Based on Neumann and colleagues' (2021) article, we refined the scale by selecting those items that had: (1) the strongest item-to-target factor relations in the CFA; (2) comparatively lower loadings in the general factor of the bifactor solution; and (3) reduced cross-loading in the ESEM to minimize domain overlaps. Furthermore, we considered other empirical aspects such as (4) greater discrimination indices and (5) high representativeness scores obtained in experts' ratings (i.e., based on the theoretical roots of each comic style). Combining all

these sources of information, we made two selections of 32 and 24 items respectively (4 vs. 3 items per latent variable). These selections sought to incorporate those SP-CSM markers with the best psychometric properties without undermining the particular content covered by each assessed comic style. After that, we tested the psychometric behavior of the scores of our short version of the CSM in terms of internal consistency, temporal stability, factorial invariance across gender (men/women), age (younger/older participants), and culture (Spanish/ U.S. American citizens), and its correlates with different well-being measures, namely: life satisfaction, self-esteem, happiness, self-rated health status, loneliness, and negative emotional states (i.e., depression, anxiety, and stress).

***Hypotheses.*** We anticipated that scores of our short SP-CSM to be (1) internally consistent and (2) temporally stable. Regarding factorial invariance and latent mean comparisons, we anticipated that (3a) men would report greater scores than women on all comic styles, with larger differences in those conceptualized as socially aggressive (e.g., Hofmann et al., 2023); and that (3b) younger participants would report higher scores than older ones on fun and on all the mockery-related comic styles (Mendiburo-Seguel & Heintz, 2020; Ruch et al. 2018). As for cultural differences, (4c) similar mean-scores are expected for Spanish and U.S. American citizens, with Americans being slightly more inclined to the use of mockery-related comic styles (Heintz et al., 2020; Schermer et al., 2023). Finally, we hypothesized (4a) benevolent humor being the most predictive domain for positive levels of well-being (followed by other lighter comic styles) with (4b) cynicism (and to some extent sarcasm) yielding the opposite pattern of associations (Ruch, Wagner, et al., 2018).

## 2 Method

### 2.1 Participants

**Spanish participants.** Sample 1 (S1) consisted of 925 Spanish adults (549 women [59.4%], 360 men [39.6%], and 16 who preferred not to state their gender [1.7%]). Ages ranged from 18 to 76 years ( $M = 37.56$ ,  $SD = 12.05$ ,  $Mdn = 38$ ). This sample size seems to be suitable for analyzing structural equation models (Bandalos, 2014; Nunnally & Bernstein, 1967) and for detecting stable estimations for even small latent correlations (i.e.,  $\rho = .10$ : Kretzschmar & Gignac, 2019). Out of the 925 Spanish adults, 193 (121 women [62.7%], 69 men [35.8%], and 3 who preferred not to state their gender [1.5%]) agreed to complete the survey at Time 2 (Sample 2 [S2] = test-retest). Their ages ranged from 18 to 66 years ( $M = 35.54$ ,  $SD = 11.17$ ;  $Mdn = 32$ ).

**American participants.** Sample 3 (S3) encompassed 318 U.S. American adults (157 women [50.6%] and 161 men [49.4%]). Individuals' ages ranged from 21 to 81 years old ( $M = 38.10$ ,  $SD = 11.72$ ,  $Mdn = 35$ ). Most participants (63.8%) identified themselves as Caucasian/White, 12.3% as Black/African American, 11.9% as Native American, 6% as Hispanic/Latino, 4.1% as Asian American, and 1.9% as other or undisclosed ethnicity. For a more detailed description of the participants' demographics of S1, S2, and S3 see Supplementary Material.

### 2.2 Instruments

**Comic styles.** The CSM (Ruch et al., 2018) was included in the surveys administered to S1, S2 (Spanish-version; translated for this study) and S3 (English-version). It comprises a total of 48 statements assessing individual differences in eight comic styles (six items per humoristic domain): (a) fun (e.g., "I like to be clownish"); (b) irony (e.g., "I can converse with close friends in a way that only we know what is meant, but outsiders don't sense that it is merely irony"); (c) wit (e.g., "I have a sharp

wit and intellect and can tell stories with many punch lines”); (d) sarcasm (e.g., “Biting mockery suits me”); (e) benevolent humor (e.g., “On a large and small scale, the world is not perfect, but with a humorous outlook on the world I can amuse myself at the adversities of life”); (f) satire/corrective humor (e.g., “I parody people’s bad habits to fight the bad and foolish behavior”); (g) nonsense humor (e.g., “Absurdities amuse me”); and (h) cynicism (e.g., “I have a cynical attitude towards some common norms and moral concepts; I don’t believe in them and mostly find them ridiculous”). Scores are provided on a 7-point Likert-type response format ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The items and instructions for the administration of the SP-CSM are provided in the Electronic Supplementary Material (see Table SM1).

***Life satisfaction.*** The *Satisfaction with Life Scale* (SWLS; Diener et al. 1985; Spanish version by Cabañero et al., 2004) was administered to S1. The SWLS is the standard measurement for evaluating life satisfaction (e.g., “I am satisfied with my life”). It employs five items on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

***Happiness.*** The *Subjective Happiness Scale* (Lyubomirsky & Lepper, 1990; Spanish version by Extremera & Fernández-Berrocal, 2014) was also administered to S1. This measure is a four-item scale designed to measure overall perception of happiness thorough self-evaluations. Each statement is answered using a 7-point Likert scale. Response options change for each of the four items. Item 1 assesses the extent to which the participants consider themselves to be happy from 1 (*not a very happy person*) to 7 (*a very happy person*). Item 2 refers to the level of happiness of the person in relation to their peers (1= *less happy*; 7 = *more happy*). Finally, Items 3 and 4 describe happy and unhappy people, respectively, and ask the

participants how identified they feel with each statement from 1 (*not at all*) to 7 (*a great deal*).

***Self-rated health status.*** The *Single-Item Self-Rated Health* (Ware & Sherbourne, 1992; Spanish-language form used in Navarro-Carrillo et al., 2021) was administered to S1. This simple indicator captures a subjective evaluation of an individual's own health status (e.g., "In general, would you say your health is"), using a 5-point Likert Scale (1= *very bad*; 5 = *very good*).

***Self-esteem.*** The *Single-Item Self-Esteem Scale* (Robins et al., 2001; Spanish version by Doroszuk et al., 2020) was administered to S1. This single-indicator assesses subjective self-esteem ("I have high self-esteem"), employing a 5-point Likert Scale (1= *not very true of me*; 5 = *very true of me*).

***Loneliness.*** The *Three-Item Loneliness Scale* derived from the Revised UCLA Loneliness Scale (Russell, 1996; Spanish version by Rico-Urbe et al., 2016) was also administered to S1. It assesses feelings of loneliness or social isolation (e.g., "How often do you feel that you lack companionship") employing a 3-point Likert Scale (1= *hardly ever*; 3 = *often*).

***Negative Emotional States.*** The short forms of the *Depression, Anxiety, and Stress Scales* (DASS; Lovibond & Lovibond, 1995; Spanish version by Bados et al., 2005) were administered to S1. The DASS evaluate how often, over the past week, an individual experiences certain symptoms representative of three interrelated negative emotional states, namely: depression (e.g., "I could not seem to experience any positive feeling at all"), anxiety (e.g., "I was aware of dryness of my mouth"), and stress (e.g., "I found it hard to wind down"). These scales comprise a total of 21 items (7 per dimension) and respondents rate each statement on a 4-point Likert-type scale from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*).

## 2.3 Procedure

### 2.3.1 Development of the SP-CSM

**Spanish translation.** Following the standard procedure for back-translation, all the CSM statements were firstly translated into Spanish seeking a good content and cultural fit, and then independently back-translated into English. Original and back-translated versions were compared in terms of their item-content by the members of our research group and the original authors of the scales. These versions showed high correspondence and minor semantic discrepancies in wording were solving based on consensus discussion.

**Experts' ratings of item relevance.** To get further validity evidence based on the scale-level content (Angleitner et al., 1986), five independent psychologists with expertise in test construction evaluated to what extent the translated items adequately represented the constructs of interests. Independent brief descriptions of all comic styles—covering the core theoretical roots of each target-dimension—were provided to the experts. They then were asked to determine the comic style to which each item belongs and rated the item representativeness (i.e., saturation with content referring to the target comic style). Responses were given on a 5-point rating scale (0 = *not representative*; 4 = *very representative*). All items exceeded fair-to-good item-content validity indexes ( $I-CVIs \geq .60$ ;  $Mean = .95$ ) and inter-judge Kappa's agreement ( $\kappa_s \geq .42$ ,  $Mean = .94$ ; Polit et al., 2007). Experts also evaluated certain formal wording aspects of all items (i.e., from 0 to 4 for comprehension, ambiguity, and conciseness). Notably, all the SP-CSM items were highly accessible, clear, and concise ( $\geq 3.60$ ).

### 2.3.1 Administration of the CSM.

**Online Surveys.** An online method was utilized in all samples. Data from both samples were gathered using Qualtrics XM platform. Spanish participants were

contacted through social media (e.g., Facebook groups) and cross-platform instant messaging applications (i.e., Telegram). These participants were directed to another website where they entered in a drawing for €50 for full completion in compensation. They were also asked for a personal code and a mail account (registered in an independent database) in case they wanted to participate in a second phase of our research (test-retest sample) and thus having access to a second participation in the draw. After six months, all those who completed these data received an email with the instructions for participation. U.S. American participants were recruited from Amazon's Mechanical Turk (<https://www.mturk.com>; US\$1.00 for full completion).

The inclusion criterion was being at least 18 years of age across all samples (Supplemental Material includes a detailed description of exclusion criteria). All participants also had a good command of Spanish (for S1 and S2) or English (S3). Irrespective of the country, all participants provided written informed consent and received the same instructions: (A) A brief description about the nature of the investigation; (B) guarantees about the confidentiality and anonymity of their responses as well as the voluntary nature of their participation, and (C) the average response time to complete the survey. All studies were carried out in accordance with the standards of the Declaration of Helsinki and the research procedures were approved by the local Research Ethics Committee in Human Research (962/CEIH/2019).

## **2.4 Data Analysis**

*Psychometric properties of the items.* Item-level descriptive statistics (i.e., mean, standard deviation, skewness, and kurtosis) and corrected item-total correlations (or discrimination indexes [ $r_{it}$ ]) were applied for the 48 items of the SP-CSM in S1.

*Dimensionality.* Preliminary evidence of the factorial structure of our translated instrument was obtained through a set of latent models aimed to examine how well



these structures accounted for item covariation of the SP-CSM in S1. Nine model types were computed. **Model A:** One-factor structure or general humor factor. **Model B:** Two-factor structure comprising the lighter (fun, wit, benevolent, and non-sense humor) vs. the darker (irony, sarcasm, satire, and cynicism) comic styles. **Model C:** Three-factor structure subsuming the already mentioned mockery-related styles, but dissociating the lighter styles in two dimensions: enjoyment of humor (i.e, nonsense and fun) and good humor (wit and benevolent humor). **Model D:** Ruch et al. (2018)'s original structure with eight correlated factors. **Model E:** A second-order structure in which the supra-dimensions (lighter or darker) described in Model B subsume their corresponding comic styles. **Model F:** A bifactor model that partitions the item variance between a general humor domain and eight orthogonal specific factors. **Model G:** An ESEM model which allows a certain degree of overlap (i.e., cross-loadings) between the items of the eight factors of the CSM. Furthermore, as mentioned earlier, using the information derived from all tested latent models along with other sources such as items' discrimination indices and experts' ratings, we selected the CSM markers that better capture the *unique* elements of each comic style. Then, we tested the original structure again with eight correlated factors, but with both the reduced 32-item (**Model H**) and 24-item (**Model I**) versions of the SP-CSM.

For all these factorial analyses, we used the Robust Maximum Likelihood (MLR) estimator because of: (1) Its adequacy to our sample size (< 1,000); (2) the response scale of the SP-CSM (1-7); and (3) its robustness against potential non-independence of observations or non-normality of the data (see the slight asymmetry of the items in Table SM2). To identify the optimal solution in terms of goodness-of-fit, we followed well-known recommendations of the thresholds for model fit evaluation:  $CFI \geq .90/.95$ ,  $TLI \geq .90/.95$ ,  $RMSEA \leq .10/.08$ , and  $SRMR \leq .08/.06$  reflecting an

acceptable-to-excellent fit (Brown, 2015; Hu & Bentler, 1999; Kaplan, 2000). Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC) were also used to compare different models. Latent models with lowest AIC and BIC reflect better fit to the data and should be favored.

**Total scores, internal consistency, and Temporal Stability.** Domain-level statistics were also computed. Within the assessment of reliability estimates, we calculated both Cronbach's alpha ( $\alpha$ ) and McDonald's omega total ( $\omega_t$ ) coefficients. We also examined the temporal stability of the observed data in S1 and S2 using the Intraclass Correlation Coefficient (ICC) with absolute agreement.

**Measurement Invariance.** The invariance of the CSM across gender (men *vs.* women [S1]), age (younger *vs.* older participants [S1]), and country (Spanish *vs.* U.S. American citizens [data from S1 and S3]) was explored using a set of Multigroup CFA (MG-CFA). We compared three invariance models differing in their level of restriction (Milfont & Fischer, 2010): (1) configural model (i.e., requiring CSM factorial structure to be invariant across comparison groups); (2) metric model (i.e., item factorial loadings to be equal across groups); and (3) scalar model (item intercepts to be invariant across groups = strong/full invariance). The nested model was always compared to its preceding model in terms of model fit. Since  $\chi^2$  indicator is highly sensitive to sample size (Hu & Bentler, 1998), we used  $\Delta$ CFI and  $\Delta$ RMSEA, which should not exceed .010 and .015, respectively (Chen, 2007), to assess the difference between the consecutive models.

**Test-criterion validity.** Pearson's correlations were used to assess the bivariate relationships between SP-CSM and the well-being measures. Further, a structural equation model (SEM) was designed in which the eight comic styles were predictors of

life satisfaction, happiness, loneliness, and the tendency to experience negative emotional states. Again, we chose the MLR estimator for this analysis.

**Software.** All modeling was carried out via Mplus 8.1. Software (Muthén & Muthén, 2012–2019) and the remaining analyses were conducted using JASP (Version 0.16.2; JASP Team, 2022) or IBM SPSS Statistics for Windows (Version 21.0; IBM Corp., 2012).

**Data Availability.** Data and all analyses codes are available at the Open Science Framework: [https://osf.io/yfdp6/?view\\_only=cb2debddc9c74d17b6c2f9bedde0a44c](https://osf.io/yfdp6/?view_only=cb2debddc9c74d17b6c2f9bedde0a44c).

### 3 Results

#### 3.1 Psychometric Properties of the SP-CSM

**Item-level parameters.** Score distributions suggest the absence of floor and ceiling effects ( $2.19_{[SAR44]} \leq M \leq 5.90_{[NON7]}$ ) and high between-subject variabilities ( $SD \geq 1.27_{[HUM37]}$ ) in all item-responses irrespective of the comic style analyzed. Item scores spanned the entire range of the response scale (1-7). Skewness and kurtosis estimates reflected approximately normal shapes for most items ( $\leq |2|$ ; see Pituch & Stevens, 2015). An in-depth inspection (see Table SM2) revealed (slight) left-skewed distributions and scores more concentrated around the mean for certain items measuring lighter comic styles (e.g., nonsense) rather than for those capturing mockery-related comic styles (e.g., cynicism/sarcasm). All 48 items displayed excellent discrimination indices in their target-dimensions ( $\geq .43_{[IRO26]}$ ), with the exception of SAR44, which still yielded an acceptable estimate (.29).

**Competitive factorial structures.** As can be seen in Table 1, latent models representing the 48 items of the SP-CSM as one–(Model A), two–(Model B), or three–dimensional (Model C) showed a very poor fit. The original eight-factor structure (Model D), and its derivatives, the hierarchical (Model E) and the bifactor (Model F)

solutions, had, overall, an acceptable model fit. Note that, although their CFI/TLI values fell below the conventional thresholds for model fit evaluation ( $\leq .857/843$ ), these relatively lower coefficients were somewhat expected<sup>1</sup> and reasonable when considering the large number of variables per factor in the CSM, which can bias CFI values (Kenny & McCoach, 2003). Finally, the ESEM solution (Model G) performed best, being able to fit the observed data with convincing levels of precision based on all fit indices.

As mentioned earlier, we then inspected item factorial loadings and modification indices from all tested models to identify potential sources of model misspecification (Neumann et al., 2021; see Tables SM2-SM5 in the Supplementary Materials).

Regarding the resulting scale-refinements, the 32-item selection (Model H) had a slightly worse model fit than the 24-item solution (Model I). This may relate to the fact that this version still contains indicators with substantive cross-loadings (e.g., SAR28 in cynicism; see Table SM5). Hence, as expected, the selection of 24 items (Model I) yielded the clearest representation of the original eight correlated factors. This model reflects good-to-excellent values for all incremental and absolute coefficients, while being the factorial solution that uses the fewest number of estimated parameters. All items had significant and convincing loadings on the factor representing their target comic style (Table SM6).

Altogether, one might conclude that both the ESEM solution for the 48-item version of the SP-CSM and the scale reduction to 24 items offered the clearest results in terms of latent structure. Factor correlations of these models are given in Table 2, showing numerically lower associations (i.e., reduction of overlaps) compared to the original eight-factor structure with 48 items (Model D). Bearing all this information in

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<sup>1</sup> It has been stated that when RMSEA for the null model is lower than .158, incremental fit indices are less informative (Kenny et al, 2015; Moreira & Inman, 2021). The RMSEA for the null model in this research was .132.

mind, and given that the other main objective of this study is to propose a shorter version of the CSM that optimizes the psychometric differentiation between the comic styles and facilitates its administration, we decided to focus our analytical efforts on exploring the 24-item version with eight correlated, yet independent, factors (SP-CSM-24; see also the Discussion section). This alternative is more parsimonious, has more practical advantages, and, above all, allows us to reproduce the original structure proposed by Ruch, Heintz, et al. (2018).

### **3.3. The 24-Item version of the SP-CSM – A New Shorter Form of the CSM**

*Domain-level parameters, internal consistency, and temporal reliability.* Table 3 summarizes scale mean-scores and reliabilities in terms of internal consistency estimates of the SP-CSM-24. Domain-level descriptive statistics were in line with earlier literature; that is, the highest scores were in nonsense and benevolent humor and the lowest in sarcasm. Converging with their factor-analytic origin, all the domain-scales were internally reliable (i.e.,  $\alpha/\omega_t \geq .65$ ;  $Mdn = .785/.795$ ). As also shown in Table 3, all the SP-CSM-24 domains showed good ICCs ( $\geq .71_{\text{SARCASM}}$ ), indicating a satisfying stability across the interval of 6-7 months.

*Gender- and age-level measurement invariance.* As can be seen in Table 4, all levels of measurement invariance were supported for gender and age according to  $RMSEA$  ( $\leq |.002|$ ), and  $CFI$  ( $\leq |.008|$ ) differences. Group differences are presented in Table SM8 in the Supplementary Materials. Men were more likely than women to report higher scores on the darker comic styles such as cynicism, satire, and sarcasm. They were also more inclined to use irony, wit, and nonsense humor—but these effects were smaller in magnitude. No gender differences emerged for fun and benevolent humor. Finally, no age-based differences emerged, with the exception of fun, which was more pronounced in younger than older participants.

**Country-level measurement invariance.** As a preliminary step, we corroborated that the eight-correlated factor structure of the CSM seemed to be more accurately reproduced when considering our 24-item selection also in the U.S. American sample:  $\chi^2(224) = 368.11, p < .001; CFI = .952; TLI = .940; RMSEA = .045$  (90% CI [.037, .053]);  $SRMR = .047; AIC = 25,675.21; BIC = 26,051.41$ , than the full 48-item version:  $\chi^2(1052) = 1,732.85, p < .001; CFI = .908; TLI = .902; RMSEA = .045$  (90% CI [.041, .049]);  $SRMR = .061; AIC = 50,674.34; BIC = 51,321.41$ .

Table 4 also shows the fit indices derived from the MGCFA conducted to test the cross-cultural equivalence of the CSM across Spanish and U.S. American samples. Our results supported configural and metric invariance. Nevertheless, full scalar invariance did not hold, as some item-intercepts seems to be non-invariant across countries. We then used modification indices to identify those specific indicators with the highest contributions to model misfit. We iteratively relaxed items constrains and retested the scalar model after each change to get partial scalar invariance. We unconstrained the intercepts of the items SAR12, HUM37, NON7, WIT35, SAR4, and FUN4, which enabled us to establish partial scalar invariance with model indices within an acceptable range (see Table 4). Regarding latent mean differences (see Table SM8), Spanish participants reported greater levels of fun, irony, nonsense, and benevolent humor, while U.S. Americans showed greater scores<sup>2</sup> on cynicism and, to a lesser extent, satire. No significant differences emerged for wit.

**Connections with well-being.** Bivariate correlations of the SP-CSM subscales with the well-being measures<sup>3</sup> appear in Table 5. SEM was then applied to test, simultaneously, the effects of all the comic styles on the inter-individual variability in

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<sup>2</sup> U.S. Americans also had higher scores on the sarcastic comic style than Spaniards; however, we suggest interpreting this comparison with caution as 2 items of this domain were found to be non-invariant.

<sup>3</sup> Domain-level statistic descriptives, internal consistencies (all  $\alpha$ s/  $\omega$ s  $\geq .80/81$ ), and interrelations of the well-being measures are presented in Table SM9 in the Supplementary Materials.

well-being. To maintain the balance of items between measures, three indicators were used for each latent variable. For the eight comic styles and the loneliness measures, we used all the items of SP-CSM-24 (three items per comic style) and the three items of the Loneliness Scale, respectively. Regarding life satisfaction (5 items) and happiness (4 items), we selected their three most representative items (i.e., based on [higher] discrimination indexes) as indicators. Finally, since the mean scores of depression, anxiety, and stress were strongly correlated ( $r_s \geq .63$ ; see Table SM9) and yielded (virtually) non-existent discriminant correlates with the SP-CSM-24 (see Table 5), we assessed the tendency to experience these negative emotional states as a unitary construct using these three mean scores as independent indicators. Note that single-indicators of self-esteem and self-rated health status were not included in the SEM.

Our model displayed a good fit to the observed data:  $\chi^2(528) = 1,516.06$ ,  $p < .001$ ;  $CFI = .935$ ;  $TLI = .923$ ;  $RMSEA = .045$  (90%  $CI$  [.042, .048]);  $SRMR = .048$ . Figure 1 illustrates the SEM with standardized path coefficients from the eight comic styles to well-being measures. Benevolent humor and cynicism outperformed other humoristic personality traits in accounting for individual differences in well-being. Whereas benevolent humor had meaningful connections with high life satisfaction, high happiness, low loneliness, and a lower inclination to experience negative emotional states, cynicism showed the opposite pattern of associations. Satire was identified as the third-most predictive comic style, reflecting a network of associations highly comparable to that obtained for benevolent humor—but with effect sizes smaller in magnitude. Irony was a negative predictor of well-being, as it was linked to diminished expressions of life satisfaction and happiness and increased loneliness and negative emotional states. Wit yielded significant associations with higher levels of life satisfaction and happiness and lower loneliness. Sarcasm was only negatively related to

happiness. Finally, when controlled for their overlaps with other comic styles, fun and nonsense humor were rather unrelated to well-being.

#### 4 Discussion

Our investigation was focused on adapting the CSM (Ruch, Heintz, et al., 2018) to a different cultural context such as Spain and, at the same time, developing a shorter form of this measure that enhances the psychometric differentiation of the comic styles from each other. Three major findings emerged. In response to the inconsistencies observed in the literature regarding the CSM dimensionality, we (1) generated a 24-item version that seems to reproduce in a more accurate way the original latent structure of eight independent, yet correlated factors. The SP-CSM-24 scores were (2) internally and temporally reliable, as well as robust in terms of factorial structure, obtaining full invariance across gender and age groups, and partial invariance across cultural contexts (Spanish/U.S. American samples). Finally, (3) our instrument also evidenced good test-criterion validity, as we observed coherent associations with well-being that made possible to empirically differentiate the *unique* predictive capacity of each comic style.

***Why create a short version of the SP-CSM?*** By making a scale-refinement of the SP-CSM, we sought to develop a more practical version without losing psychometric quality. Even further, our 24-item selection seems to offer a clearer extraction of the eight interrelated, yet distinct comic styles coined by Ruch, Heintz, and colleagues (2018). Besides loading more strongly on their corresponding comic style, these 24 markers loaded less strongly on the general factor of the bifactor solution and had comparatively minimal cross-loadings (Neumann et al., 2021). This allows us to reduce communalities between constructs and to put more weight on the small set of items that better capture the unique aspects of each CSM domain. This appears to be especially relevant for the mockery family of comic styles. Similar to the original



version (Ruch, Heintz, et al., 2018), the content of certain items written for one darker comic styles led them to significantly double-load on other factor/s: for instance, item 36 of sarcasm “*I am often malignant and critical if I decry the corruption, depravity, vice, or evil*” loaded on satire and, to a lesser extent, cynicism (see Table SM5). The non-selection of these items reinforces a basic premise of the CSM, that is, to assess partially overlapping constructs that reflect independent psychological phenomena. Importantly, the item reduction did not appear to affect the internal consistency or the temporal stability of the scores of the SP-CSM-24, nor its test-criterion validity (i.e., no apparent trade-offs). Hence, our shortened version should be suitable for use across Spanish samples, as it can help researchers to reduce administration time and to minimize respondents’ fatigue, boredom, and dropout rates (Coelho et al., 2018; Rammstedt & Beierlein, 2014).

Note that, using all the 48 statements of the original CSM, the ESEM solution also showed an adequate fit. Researchers interested in using the long version of the SP-CSM could use this internal representation to delve deeper into the relationships of the comic styles with external variables. However, several authors have stated the practical limitation of the ESEM, hindering the creation of specific composite scores and yielding a less clear interpretation of the unidimensional factors (Neumann et al., 2021). For these reasons, we advocate the use of our reduced version of 24 items, at least, in Spanish and U.S. American samples.

***Demographics-based differences in the CSM.*** We also presented evidence to support the measurement invariance of our instrument across gender and age. This means that our measure behaved equally well across gender and age groups when discriminating among people who differ in their comic style tendencies. Regarding group comparisons, we first observed that men were more likely to describe themselves

as high in all comic styles than women, particularly in the use of sarcasm, cynicism, and satire (see Table SM8 in the Supplementary Materials). This converges well with earlier research on the CSM (Mendiburo-Seguel & Heintz, 2020; Ruch, Heintz, et al., 2018) and other offensive humoristic tendencies, such as aggressive humor (Martin et al., 2003) and katagelasticism (i.e., the joy in laughing at others; Ruch & Proyer, 2009). An interesting line of discussion would be, as outlined by Hofmann and collaborators (2023), to elucidate whether these self-perceived differences may be related or could be seen as a consequence of gender role expectations. The conceptualizations of mockery-related comic styles are infused by features traditionally associated with masculinity, such as (social) dominance, fight, and superiority (e.g., Butler et al., 2015). Masculine ideologies are embodied in cultural norms that proscribe certain gendered attitudes and behaviors. These norms also dictate specific cultural belief systems, values, and attitudes associated with masculinity (Blackburn & Scharrer, 2019; Connell & Messerschmidt, 2005). One might wonder whether these gender expectations may shape the way men habitually use humor (e.g., ridiculing others to defend a dominant position) and/or whether their increased tendency to deploy hostile forms of humor could be understood as a way to reinforce masculinity.

In terms of age-related differences, we only observed that fun scores were more pronounced among younger people. Presumably, certain behaviors connected with the fun comic styles such as “to tease friends in a funny way” or “to be clownish” seem to be more prototypical of the interpersonal relationships of younger people. This fits well with the notion that extraversion (subsuming energetic and sociable tendencies) generally declines across the life span (Donnellan & Lucas, 2008). Other studies using the CSM found age-based differences in other comic styles, with younger people having

higher scores on nonsense humor and on the darker comic styles (Mendiburo-Seguel et al., 2020; Ruch et al., 2018). However, these differences only showed small effect sizes.

***Cross-cultural equivalence of the CSM.*** We first replicated the better psychometric performance of the 24-item version, compared to the full 48-item version, in a sample of U.S. Americans, which reinforces the cross-cultural validity of our findings. Partial item-level measurement invariance emerged at the country level. This suggests that although the comic styles are perceived as independent entities in both countries with their items having similar loadings, certain items—especially those referring to a sarcastic comic style—worked differently in both countries (non-equivalent item intercepts). Ruch, Heintz, and colleagues (2018) already reported low similarity between English- and German-speaking populations for the sarcasm domain. Regarding plausible explanations for these discrepancies, we first ruled out the presence of relevant item biases, as our back-translation procedure allowed us to minimize wording differences between Spanish- and English-language versions. Furthermore, the high correspondence of our findings on the correlates of the SP-CSM with the conceptual foundations and prior empirical data on CSM (e.g., Ruch, Wagner et al., 2018) seems to suggest that our operationalization of the eight comic styles is highly comparable to that made in other cultures (i.e., absence of construct bias). Hence, this lack of invariance may be caused by more complex socio-cultural factors (Oshio, 2010), such as divergence in the social meaning and/or community acceptance of sarcastic humorous behaviors. More evidence is needed to validate this assumption.

Furthermore, latent mean comparisons indicated that, whereas Spanish people showed greater levels of fun, irony, nonsense humor, and benevolent humor, U.S. Americans were more inclined to cynicism and, to a lesser extent, satire. A plausible explanation of this pattern of results, which seems to reflect a greater use of darker

comic styles in the United States and of lighter comic styles in Spain (except for irony), might rest upon Hofstede's (1984) individualism/collectivism critical cultural value dimension. In societies with prevalent individualistic values (in this case the United States; Hofstede Insights, 2022), individuals are expected to show loose social ties with others and to place the focus on their own self and their immediate family, while in the collectivistic cultures (Spain is a comparatively more collectivistic society; Hofstede Insights, 2022) citizens favor belongingness to in-groups and define themselves in terms of "we". Our results yielded predominance of comic styles determined by a critical nature (e.g., cynicism) in the United States and of comic styles that share certain positive features, such as interpersonal cooperation or benevolence, in Spain. These observations are aligned with the notion that outlining criticism in an open manner might be more acceptable and tolerable in individualistic than in collectivistic societies, where instead disputes tend to be avoided for the sake of group-based harmony (Ting-Toomey et al., 1991). These findings also tie in with prior research on culture-related personality and humor usage reporting that individualism is indicative of a greater use of aggressive humor and that personal-level collectivism indicates higher affiliative humor (Kazarian & Martin, 2004).

***Comic styles as predictors of well-being.*** Using a SEM approach, we demonstrated that the comic styles can be well dissociated in their connections with external criteria. These divergences reinforce their conceptualization as interrelated, yet independent humoristic phenomena (Ruch, Heintz, et al., 2018). Converging with earlier works (Ruch, Wagner, et al., 2018), we observed the strongest manifest and latent correlations between benevolent humor and positive well-being. Benevolent humoristic tendencies can be used to arouse sympathy for the imperfections of the world, which may help to overcome negative events or to minimize their perceived

severity for oneself or others (Ruch, Heintz, et al., 2018). This seems to translate into people high in this comic style of humor displaying greater levels of happiness, self-rated health, and life satisfaction, along with lower levels of loneliness and negative emotional states, such as depression. The other side of the coin was cynicism, which showed the opposite pattern of associations. A potential explanation is that cynical humoristic behaviors could be manifestations derived from unpleasant personal feelings (e.g., perceiving oneself as dissatisfied or lonely). Alternatively, one might argue that the tendency to ridicule core aspects of others' identity such as moral or social values can lead cynics to have worse functioning in their day-to-day life: Being more isolated, having more negative experiences, and being less satisfied in general.

Interestingly, after excluding those markers that generated greater ambiguity in the structure of the CSM, satire emerged as a small positive predictor of well-being. Prior research has shown around zero correlations ( $\leq .10$ ) between this comic style and well-being indicators, such as life satisfaction, positive and negative affect, and happiness (Mendiburo-Seguel & Heintz, 2019; Ruch, Wagner, et al., 2018). One might argue that by excluding the redundant content with other mockery-related comic styles, the more specific aspects of the satire domain (e.g., moral elements oriented to make things better) may have a beneficial side for the individual (see Ruch & Heintz, 2016). Conversely, irony showed the same negative relationships with well-being reported in other studies (Ruch, Wagner, et al., 2018). Other conceptually consistent and remarkable correlates were: (A) a witty comic style related to lower loneliness and to higher happiness and self-esteem; and (B) a sarcastic comic style linked to lower happiness. Overall, note that all these singular associations reflected small effect sizes, which, on the other hand, seems to correspond to a realistic view of the impact of humor on people's well-being (Heintz et al., 2020; Ruch, Wagner, et al., 2018).

***Limitations and future research.*** This investigation is not without limitations. Despite collecting a large sample of Spanish adults ( $N= 925$ ), generalizability of our findings is limited to a specific Spanish-speaking culture (Spain) and groups (high-educated adults) here represented. Research including participants from other Spanish-speaking countries (Chile, Colombia, Ecuador, Peru, etc.) and more diverse samples in terms of social class should be conducted to corroborate the sound psychometrics of our translation. Similarly, our investigation only provides evidence of how the 24-item version of the CSM seems to perform adequately in Spanish and U.S. American samples. Before claiming its use worldwide, this item selection should be examined in relation to other versions of the CSM, such as those carried out for Portuguese (Moreira & Inman, 2021), Italian (Dionigi et al., 2022), and German (Ruch et al., 2018) populations.

Another limitation is that we mainly included traditional and isolated well-being measures to examine the test-criterion validity of the SP-CSM. It would be necessary to corroborate the consistency of its relationships by considering more comprehensive well-being frameworks (PERMA model), alternative personality criteria (e.g., Big Five/HEXACO model) and socio-affective outcomes. Moreover, given that the main goal of this piece of research is to establish an instrument that allows for a clearer psychometric differentiation of the comic styles, an extension toward peer-ratings will serve to know whether this differentiation may be extended toward alternative sources of information, such as peer assessment (e.g., can people perceive others' differences in satirical or cynical humoristic behaviors?). Finally, all data were collected through an online modality. Therefore, we cannot rule out the possible influence based on the mode of administration (paper-pencil vs. online) on the responses to our version of the CSM.

## **5 Conclusions**

Using a comprehensive item-level psychometric approach, we introduced a psychometrically sound shorter form of the CSM that reflects better the theorized structure of eight interrelated, yet distinct, comic styles. By means of making a scale-refinement of the CSM markers (reducing overlapping content), our selection appears to provide a clearer separation of the eight comic styles in terms of both latent structure and associations. This research may therefore represent a first step to overcome some concerns regarding the factorial validity of the CSM and provide an efficient short version.

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**Table 1** Model Fit Indices for the Competitive Latent Structures of the Spanish Version of the Comic Style Markers

Competitive Latent Models	$\chi^2_{(df)}$	<i>CFI</i>	<i>TLI</i>	<i>RMSEA</i> [90% <i>CI</i> ]	<i>SRMR</i>	<i>AIC</i>	<i>BIC</i>
Model A: One-factor structure (general humor factor)	10,273.31 <sub>(1080)</sub>	.494	.471	.096 [.094, .098]	.104	161,728.98	162,424.47
Model B: Two-factor structure (lighter vs. darker comic styles)	8,115.35 <sub>(1079)</sub>	.613	.595	.084 [.082, .086]	.086	159,191.84	159,892.16
Model C: Three-factor structure (mockery, enjoyment of humor, and good humor)	6,798.36 <sub>(1077)</sub>	.685	.670	.076 [.074, .078]	.093	157,638.23	158,348.21
Model D: Eight-factor structure (8 correlated comic styles)	3,872.11 <sub>(1052)</sub>	.845	.834	.054 [.052, .056]	.060	154,296.07	155,126.79
Model E: Second-order factor (supra darker vs. lighter factors)	4,094.83 <sub>(1071)</sub>	.834	.825	.055 [.053, .057]	.067	154,515.17	155,254.13
Model F: Bifactor (1 general and 8 orthogonal specific factors)	3,637.23 <sub>(1032)</sub>	.857	.843	.052 [.050, .054]	.071	154,062.47	154,989.79
Model G: ESEM (8 exploratory factors)	1,925.66 <sub>(772)</sub>	.936	.907	.040 [.038, 0.42]	.025	152,573.70	154,756.77
Model H: Revised 8-factor structure (8 correlated comic styles, 32 items)	1,351.35 <sub>(436)</sub>	.922	.911	.048 [.045, .051]	.058	102,683.16	103,282.05
Model I: Revised 8-factor structure II (8 correlated comic styles, 24 items)	631.21 <sub>(224)</sub>	.951	.940	.044 [.040, .048]	.051	77,140.54	77,623.52

*Notes.* Robust maximum likelihood (MLR) estimator; ESEM = exploratory structural equation model;  $\chi^2$  = Chi-square test of model fit; *df* = Degrees of freedom; *CFI* = Comparative fit index; *TLI* = Tucker-Lewis index; *RMSEA* = Root mean square error of approximation; *CI* = Confidence interval; *SRMR* = Standardized Root Mean Square Residual. *AIC* = Akaike Information Criterion; *BIC* = Bayesian Information Criterion.

**Table 2.** Latent Factor Correlations

	FUN	IRO	WIT	SAR	HUM	SAT	NON
<b>48-Item Version</b>							
<i>Model D: 8F</i>							
IRO	.36						
WIT	.56	.60					
SAR	.33	.75	.60				
HUM	.59	.42	.60	.53			
SAT	.37	.65	.49	.80	.54		
NON	.45	.21	.27	.15	.44	.23	
CYN	.25	.57	.35	.76	.40	.74	.31
<i>Model G; ESEM</i>							
IRO	.24						
WIT	.31	.38					
SAR	.11	.45	.28				
HUM	.31	.19	.30	.13			
SAT	.21	.53	.35	.46	.25		
NON	.40	.21	.18	.06	.32	.19	
CYN	.18	.44	.22	.43	.12	.59	.25
<b>24-Item Version</b>							
<i>Model I: 8F</i>							
FUN							
IRO	.30						
WIT	.37	.47					
SAR	.17	.53	.53				
HUM	.39	.38	.48	.37			
SAT	.22	.51	.41	.62	.45		
NON	.40	.20	.21	.11	.44	.19	
CYN	.16	.42	.26	.52	.30	.64	.29

*Notes.* IRO = Irony; SAR = Sarcasm; HUM = Benevolent Humor; SAT = Satire; NON = Nonsense; CYN = Cynicism. Coefficients; 8F = Eight-factor structure; ESEM = exploratory structural equation model  $r \geq .11/.15$  were significant at  $p < .01/.001$  (two-tailed).



**Table 3** Domain-Level Descriptive Statistics, Internal Consistency, Temporal Stability, and Intercorrelations of the SP-CSM-24.

	CSM	<i>M</i>	<i>SD</i>	$\alpha / \omega_t$	<i>ICC</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	FUN	4.77	1.53	.79/.81	.90		.31	.33	.18	.34	.24	.39	.18
(2)	IRO	5.24	1.23	.72/.73	.82	.32		.36	.40	.28	.38	.19	.34
(3)	WIT	4.52	1.32	.78/.78	.88	.33	.36		.38	.34	.31	.17	.20
(4)	SAR	3.44	1.59	.77/.78	.89	.20	.41	.40		.25	.47	.10	.41
(5)	HUM	5.37	1.14	.65/.65	.78	.33	.28	.35	.26		.32	.34	.22
(6)	SAT	3.72	1.56	.82/.82	.71	.25	.39	.33	.50	.33		.14	.50
(7)	NON	5.71	1.47	.91/.91	.88	.39	.20	.18	.12	.34	.17		.24
(8)	CYN	3.81	1.69	.86/.87	.84	.19	.35	.22	.45	.23	.53	.26	

*Notes.*  $\alpha$  = Cronbach's Alpha reliability;  $\omega$  = McDonalds' Omega total reliability; ICC = Intraclass correlations with absolute agreement; IRO = Irony; SAR = Sarcasm; HUM = Benevolent Humor; SAT = Satire; NON = Nonsense; CYN = Cynicism. Bivariate/Partial Correlations controlling for gender and age (below/above diagonal). All coefficients  $r \geq .10/12$  were significant at  $p < .01/.001$  (two-tailed).

**Table 4** Model Fit Indices of the SP-CSM-24 in Invariance Analysis across Gender, Age, and Country

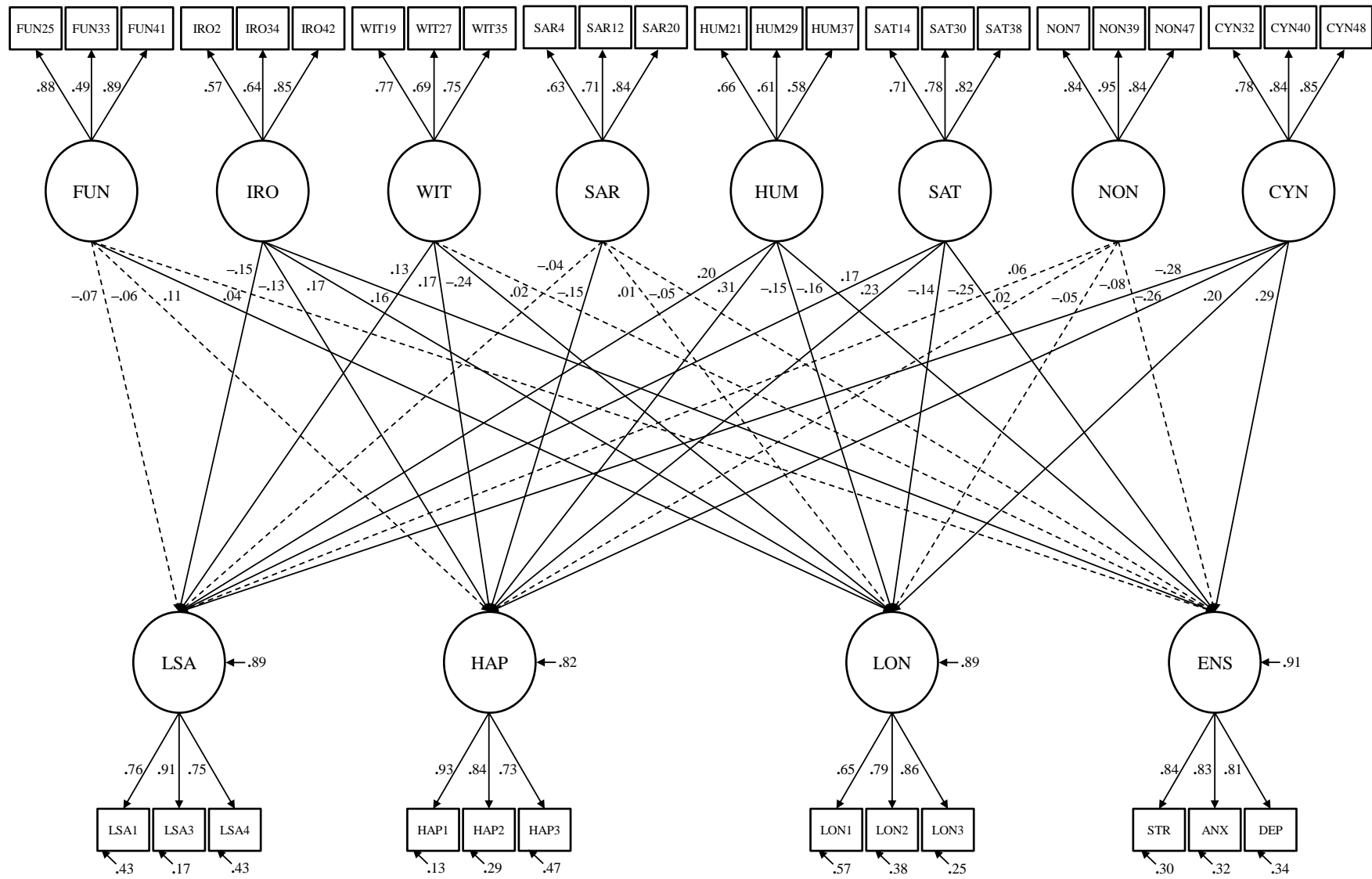
	<i>CFI</i>	<i>RMSEA</i>	$\Delta CFI$	$\Delta RMSEA$
Gender groups: Men ( $n = 360$ ) vs. Women ( $n = 549$ )				
Configural Invariance (unconstrained)	.954	.042		
Metric Invariance (measurement weights)	.951	.043	.003	.001
Scalar Invariance (measurement intercepts)	.945	.045	.006	.002
Age groups: Younger ( $n = 456$ ) vs. Older ( $n = 447$ )				
Configural Invariance (unconstrained)	.940	.050		
Metric Invariance (measurement weights)	.940	.049	.000	.001
Scalar Invariance (measurement intercepts)	.932	.051	.008	.002
Country groups: Spain ( $n = 925$ ) vs. American ( $n = 318$ )				
Configural Invariance (unconstrained)	.951	.044		
Metric Invariance (measurement weights)	.947	.045	.004	.001
Scalar Invariance (measurement intercepts)	.919	.055	<b>.028</b>	.010
Partial Scalar Invariance (non-invariant items $z$ s free)	.938	.048	.009	.003

*Note.* In the partial scalar model, the intercepts of the items SAR12, HUM37, NON7, WIT35, SAR4, and FUN41 were freed as a result of an iterative process based on the Modification Indices ( $MIs \geq 20$ ).

**Table 5** Bivariate Zero-Order Correlations of the SP-CSM-24 with Well-Being Measures

<i>Comic styles</i>	LSA	SFE	HAP	SUH	LON	STR	ANX	DEP
FUN	.00	-.01	.07	.06	.00	-.03	.01	-.03
IRO	<b>-.09</b>	-.05	-.02	<b>-.09</b>	.04	.05	.07	.04
WIT	<b>.09</b>	<b>.14</b>	<b>.16</b>	.02	<b>-.16</b>	-.02	.00	-.07
SAR	-.02	.04	-.02	-.01	-.04	.01	-.03	-.03
HUM	<b>.11</b>	<b>.10</b>	<b>.23</b>	<b>.13</b>	<b>-.13</b>	<b>-.10</b>	<b>-.09</b>	<b>-.11</b>
SAT	.02	<b>.10</b>	.08	.07	-.06	-.03	<b>-.09</b>	-.07
NON	.04	.02	<b>.10</b>	.01	-.05	-.07	-.05	-.05
CYN	<b>-.15</b>	-.03	<b>-.12</b>	-.06	.06	.08	.05	<b>.13</b>

*Note.* LSA = Life Satisfaction; SFE = Self-Esteem; HAP = Happiness; SUH = Subjective Health; LON = Loneliness; STR = Stress; ANX = Anxiety; DEP = Depression; IRO = Irony; SAR = Sarcasm; HUM = Benevolent Humor; SAT = Satire; NON = Nonsense; CYN = Cynicism. Bold coefficients  $r \geq |.09|/|.12|$  were significant at  $p < .01/.001$  (two-tailed).



**Figure 1** Structural Equation Model Testing the Direct Effects of Comic Styles on Well-being Measures. *Notes:* Solid lines indicate significant paths, and dotted lines indicate non-significant paths ( $p < .05$ , two-sided tests). Standardized coefficients are reported. The right arrows of the latent variables represent the residual variance for the dependent variables. For parsimony, the intercorrelations between the CSM domains and between the well-being indicators are not included. These coefficients can be consulted in Table 2 and Table SM10, respectively. IRO = Irony; SAR = Sarcasm; HUM = Benevolent Humor; SAT = Satire; NON = Nonsense; CYN = Cynicism; LSA = Life Satisfaction; HAP = Happiness; LON = Loneliness; STR = Stress; ANX = Anxiety; DEP = Depression. ENS = Experience of Negative Emotional States. Non-standardized parameters, standard errors, standardized parameters, and exact  $p$  values are in the OSF link for ESM.