Factor structure, gender invariance, measurement properties and short forms of the
Spanish adaptation of the Big Five Inventory-2 (BFI-2)

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Abstract

After the publication of the Big Five Inventory-2 (BFI-2) and its short versions, many validations in other languages have been published. Three studies (total N=1,673) were conducted to validate a Spanish version of the BFI-2, BFI-2-S and BFI-2-XS). Study 1 first tested the structural validity both at the domain- and facet-levels of 60 BFI-2 item translations, and tested measurement invariance across gender. Study 2 established the temporal stability of the BFI-2 using two data collection waves. Study 3 evaluated in a new sample the generalizability of the measurement properties of the Spanish BFI-2 obtained in Study 1 and the measurement properties of its abbreviated versions. The findings of these studies show that the Spanish BFI-2 is a valid and reliable measure of personality with psychometric properties corresponding to the original in English. The preliminary results of the short forms' measurement properties are promising and should encourage further replication.

Personality is often defined as the way people think, feel, and behave (Ozer & Benet-Martínez, 2006a). Individual differences in these aspects can be organized in terms of the Big Five personality trait domains (Goldberg, 1993; John, Naumann, & Soto, 2008; McCrae & Costa, 2004): Extraversion (reflecting the tendency to be sociable, assertive, and active); Agreeableness (compassionate, accommodating, and generous), Conscientiousness (orderly, diligent, and responsible), Negative Emotionality (anxious, ruminating, and moody; alternatively labeled Neuroticism or by its opposite pole, Emotional Stability), and Open-Mindedness (curiosity about diverse intellectual and cultural experiences; originally labeled Openness to Experience, Intellect, or Imagination). Furthermore, these five broad personality domains can be conceptualized hierarchically, with each domain subsuming a number of narrower personality facets (DeYoung, Quilty, & Peterson, 2007; Goldberg, 1999).

A broad body of research has investigated the relevance of the Big Five domains of personality, and consequential life outcomes, such as physical and mental wellbeing, divorce, and career development, have been established (Kotov, Gamez, Schmidt, & Watson, 2010; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007; Soto, 2019). Most importantly, these associations between life outcomes and personality are robust over the lifespan (Soto, 2020). Personality psychologists and scientists from other disciplines have reached a consensus around the Big Five domains as a valuable organization of personality structure; the robustness of the Big Five has also been explored in numerous societies, with results that typically affirm the cross-cultural importance of the five domains (Benet-Martínez & Oishi, 2008; McCrae & Terracciano, 2005; Saucier & Goldberg, 2001). Christopher Soto and Oliver John have recently created an improved

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instrument for the efficient measurement of the five domains of personality, as well as three facets within each (Soto & John, 2017b): The Big Five Inventory-2 (BFI-2).

Building on this work, the present research was conducted to evaluate the measurement properties of the scores of the Spanish version of the BFI-2, as well as to develop short and extra-short versions of it.

BFI-2 Development

One of the most prominent instruments to assess the Big Five personality dimensions has been the Big Five Inventory (BFI; see John, O. P., & Srivastava, 1999), a brief questionnaire that uses short sentences to capture individual differences on personality. It represented a landmark in the study of the Big Five dimensions: becoming one of the most used questionnaires to assess personality internationally, for it was translated and adapted from English into 28 other languages (Schmitt, Allik, McCrae, & Benet-Martínez, 2007). Although the BFI is the most prominent questionnaire, there are some other questionnaires that have been used to assess the Big Five traits. The NEO-PI-R (Costa & McCrae, 1992) is quite comprehensive and widely used, but lengthy compared to the BFI. There are shorter questionnaires, such as the NEO-FFI (McCrae & Costa, 2004), the Big Five Personality Trait Short Questionnaire (BFPTSQ; Morizot, 2014), or the International Personality Item Pool (IPIP; Goldberg et al., 2006), that can be used to derive measures short measures of the Big Five, such as the 50-item IPIP inventory of the Big Five markers (Goldberg, 1999). The latter, however, do not offer much fidelity and information on facets. Recently, since the new version of the BFI, the BFI-2, has been released, a more balanced item formulations and three unique facets per domain scale, offering more predictive precision, in a trade-off between bandwidth and fidelity is available (Soto & John, 2017b).

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The BFI-2 (Soto & John, 2017b) is a 60-item measure that can be completed in less than 10 minutes of the Big Five domains and 15 narrower facets: Extraversion (including facets of Sociability, Assertiveness, and Energy Level), Agreeableness (including Compassion, Respectfulness, and Trust as facets), Conscientiousness (Organization, Productiveness, and Responsibility), Negative Emotionality (Anxiety, Depression, and Emotional Volatility), and Open-Mindedness (Intellectual Curiosity, Aesthetic Sensitivity, and Creative Imagination). In contrast to the BFI, the BFI-2 was purposely designed to have a robust hierarchical structure with three facets subsumed within each Big Five domain. The greater conceptual scope (domain level, broad bandwidth, low fidelity) and specificity (facet level, narrow bandwidth, high fidelity) given by the BFI-2 due to this hierarchical structure contributes to greater predictive ability. The BFI-2 was constructed with an equal number of true-keyed and false-keyed items, controlling for the acquiescent response style (ARS), that is, the tendency to prefer response categories stating agreement, or disacquiescence response style (DRS), the tendency to prefer categories stating disagreement (Wetzel, Lüdtke, Zettler, & Böhnke, 2015). Finally, the BFI-2 was developed with the aim to retain the focus and brevity of the BFI despite the inclusion of explicitly measured facets.

Even considering the relative brevity of the BFI-2, there are cases in which a shorter measure is required. In large-scale surveys, for example, when several factors need to be evaluated, it may not be possible to spend more than a few minutes on the assessment of personality traits. In addition, a really short measure may be necessary in studies where participants are asked to rate themselves in multiple occasions or asked to rate themselves and others to avoid participant exhaustion and careless response.

Consequently, Soto and John (2017a) proposed a 30-item short form (the BFI-2-S) and a 15-item extra-short form (BFI-2- XS) of the BFI-2. At the domain level, these

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shortened forms retain much of the reliability and validity of the full measure. At the facet level, the abbreviated forms do not perform as well as the BFI-2, although the BFI-2-S is still useful for the assessment of facets in reasonably large samples (Soto & John, 2017a).

The BFI-2 is already gaining ground as a popular instrument for the assessment of the Big Five. In order to take a step forward in checking the feasibility of the large international implementation of BFI-2, the probability of replication in different languages has to be pursued, and it is. So far, several different translations have been validated (Chinese, Danish, Dutch, German, Norwegian, Polish, Russian, Slovak, and Turkish). In the Danish BFI-2, Vedel et al. (2020) successfully provided evidence of a valid and reliable measure in the Danish language, tweaking only a few items. Denissen and colleagues (2020) not only replicated psychometric properties of the English version in a Dutch sample, but they also provided first evidence of convergent and discriminant predictive validity of the facets by means of preregistered hypotheses. Other adaptations, such as the German, developed by Danner et al. (2019), also led to the development of short versions (Rammstedt, Danner, Soto, & John, 2020). The BFI-2 has also been translated into Slovak (Halama, Kohút, Soto, & John, 2020), Czech (Hřebíčková et al., 2020), and Russian (Shchebetenko, Kalugin, Mishkevich, Soto, & John, 2020), where the authors also showed strict measurement invariance across sex and gender. In all cases, the translations and adaptations performed similarly to the original English BFI-2.

Overview of the Present Research

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While there is a well-validated Spanish translation of the BFI (Benet-Martínez & John, 1998), no validated Spanish translation of the BFI-2 has been published yet. The present research aimed to develop and validate a Spanish translation of the BFI-2 and its abbreviated forms, the BFI-2-S, and the BFI-2-XS. Having available translations in a language allows for quick comparisons in cross-cultural research (from an -etic perspective¹), but also for efficient, hierarchical assessments of the Big Five personality domains and facets in the Spanish-speaking cultural contexts. We sought this goal through three studies. First, in Study 1 we developed a translated version of the BFI-2 items, and we examined its domain- and facet-level structure, as well as its construct validity, reliability, and invariance across genders (males and females), after collecting data on a large sample of Spanish speakers. In study 2, the temporal stability of the Spanish BFI-2 was tested, using a new sample. Study 3 further explored the nomological network of the constructs assessed in Study 1, namely, personality domains and facets, as well as the measurement properties of its abbreviated forms (the Spanish BFI-2-S and BFI-2-XS).

Study 1

Study 1 had two main goals. The first goal was to develop the Spanish translation of the BFI-2 and test its psychometric properties in a large sample of participants. The second goal was to examine the preliminary domain- and facet-level structure of the Spanish BFI-2 and its internal consistency, as well as to examine whether the Spanish BFI-2 items functioned equally in men and women, through examining gender invariance.

¹ The etic approach refers to the common practice of translating and adapting items originally adapted within one culture to another one, in contrast to an emic approach, that is based on items originally developed from within that culture (Berry et al., 2011). Imposed-etic instruments allow for quick comparisons across cultures, but they assume strict measurement invariance between countries (Gallardo-Pujol et al., 2019).

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Method

Participants

Study 1 analyzed data gathered from December 2017 to March 2019 from a large pool of freshmen and sophomore Psychology students from two large Spanish universities, and from a snowball approach via social networks that was used to complement the student samples ($N=1,000$; $M_{age}=23.1$ (range 17 to 75) years, $SD=11.1$; 81.8% female). We stopped the collection of data for this analysis when we reached a thousand participants, and all data were complete, since compulsory response was enforced in the data-collection website.

Procedure

Data Collection

All data were collected online using the online platform *Qualtrics*, and participants completed the surveys at home. Students who participated in the study received course credits as compensation. General population participants did not receive any compensation. The committee of bioethics of the University of Barcelona (Institutional Review Board 00003099) approved this study. After obtaining written permission from Dr. Soto, the BFI-2 was translated into Spanish. The translation procedure was done following the back-translation method. This is a judgmental procedure for investigating the conceptual equivalence of the original and translated versions, necessary for valid cross-cultural comparisons (Berry, Poortinga, Breugelmans, Chasiotis, & Sam, 2011). Thereby, several Spanish psychology researchers with in-depth knowledge of English translated this questionnaire to Spanish. Then, a bilingual professional translator was engaged in the translation process to achieve semantic equivalence and conducted a

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back-translation from Spanish to English. This version was then distributed to another researcher with in-depth knowledge of English who independently compared the original English version of the BFI-2 with the back-translated items for noticing any non-equivalence of meaning of the translation. This process of translation and back-translation was continued until no semantic differences were noticed between both forms (Brislin, 1980). Although the researchers were not professional translators, their experience as scholars in Psychology provides them enough reliability to translate this sort of questionnaire. At a revision meeting, a discussion took place to agree on a final version of the items that was then applied. The survey is still active for norming purposes (see <https://osf.io/kp572/>).

Measures

Big Five Inventory-2 (BFI-2)

The BFI-2 (Soto & John, 2017b) is a self-reported measure of personality traits whose structure is delineated by the Big Five model (Goldberg, 1993). The inventory consists of 60 items which are scored on a five-category rating scale (1 = *disagree strongly*, 5 = *agree strongly*). The measure's 60 items are short, descriptive phrases with the common item stem "I am someone who....," followed by item-specific content (first item., "Is outgoing, sociable"). In addition to the big five dimensions, the BFI-2 items are used to estimate three narrower factors (called facets) and one method factor (modelling acquiescence) per dimension. The original authors provided adequate evidence for the structure, reliability, and validity of the BFI-2 domain and facet scales. Cronbach's alpha reliabilities of the 12-item domain scales averaged .87 in their study, with a range of .83–.90 across samples. Alpha reliabilities of the 4-item facet scales averaged .76 and .77 in two validation samples, with a range of .66–.85 across samples. Our internal

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consistency coefficient estimates (Cronbach's α , and McDonald's ω) in the present study are presented in Tables 1 and 2 and discussed below. Multiple coefficients were used in addition to Cronbach's alpha itself since this has been criticized because it can yield biased estimates when items are congeneric, and their average primary loads are below .70 (Padilla & Divers, 2015). The full list of items translated into Spanish is available in Appendix A.

Statistical Analyses

The statistical analyses in this study intended to replicate the methods used by Soto & John (2017b) in their Study 3. To test the facet-level structure within each domain that these authors suggested, the 60 items were also subjected to confirmatory factor analyses (CFA: See <https://osf.io/kp572/> for the scripts). To conduct the CFA, we used the lavaan package (Rosseel, 2012) in R. Given the distribution of the responses' data, we treated them as continuous, using the maximum likelihood estimator (i.e., estimator="ML" in lavaan). ML offers a similar performance to other estimators (e.g. diagonally weighted least squares estimator with robust corrections "WLSMV") in large samples and more than 3 categories per variable (Beauducel & Herzberg, 2006). Five different models were fit to the data, one for each domain (e.g. Figure 1). These models were drawn from Soto & John (2017b). Model 1 posits a single substantive factor with no acquiescence effects. Model 2 posits two orthogonal factors with all BFI-2 domains' items loading on one domain factor and all BFI-2 domains' items loading on an acquiescence factor. Model 3 posits two method factors, for positively and negatively keyed items respectively. Model 4 posits three factors representing the three BFI-2 facet scales within each domain. Each item was only allowed to load on a single facet factor, and the three facet factors were allowed to intercorrelate. Model 5 posits model 4 plus

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one acquiescence factors in which all domain's items load. The CFA fit was evaluated by different indices such as the Root Mean Square Error of Approximation ($RMSEA < 0.08$, I.C. 90%), Chi-square (χ^2 and P-value), the Comparative Fit Index ($CFI > 0.95$), and the Standardized Root Mean Square Residual ($SRMR < 0.10$), as suggested in the literature (Erkut, 2010). The above indexes were used to assess the degree to which the models fit the data (Hu & Bentler, 1999). In order to establish the Spanish BFI-2 domain-level structure, we also performed a Principal Components Analysis (PCA) with Varimax Rotation, and a bi-factor Exploratory Structural Equation Modeling using the SLiD algorithm (García-Garzón, Nieto, Garrido, & Abad, 2020).

For testing measurement invariance (MI), we imposed a series of equality constraints among the parameters that define their measurement models following standard procedures (Meredith, 1993). Briefly, we tested three types of invariances in the present study. First, we tested across groups whether the latent factors are being indicated by the same clusters of items (i.e., equal factorial structure or configural invariance), whether the meaning of the indicators reflect the latent factor vary similarly (i.e., equal factor loadings or metric invariance), and whether the average scores of the subjects in the indicators are similar (equal item intercepts or scalar invariance). We tested MI via both the Likelihood Ratio Test (LRT) and changes in goodness-of-fit indices (Chen, 2007). The LRT is a chi square (χ^2) difference test in which the goodness-of-fit of a model with group-equality constraints is compared to an unconstrained model. Non-significant differences in the LRT implies that measurement invariance is tenable. However, when sample size is large, the LRT becomes sensitive to even small deviations from invariance. Therefore, the LRT has been regularly supported with changes in goodness-of-fit indices such as the CFI, the RMSEA, and the SRMR (Chen, 2007), which are more robust to LRT's false positives (i.e., yielding non-invariance

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when the degree of non-invariance is negligible). Configural invariance was acknowledged when the goodness of fit of the models reached the following cut-offs ($CFI > 0.9$, $RMSEA < .10$, $SRMR < .05$). Metric and scalar invariance was tested both with the LRT and Chen's (2007) guidelines for unequal samples sizes rounded to the second decimal ($\Delta CFI > 0.01$, $\Delta RMSEA < 0.01$ & $\Delta SRMR < 0.03$ for metric invariance, or $\Delta SRMR < 0.01$ for scalar invariance).

INSERT FIGURE 1 AROUND HERE

Results

Descriptives, Reliability, and Intercorrelations for the BFI-2

Table 1 shows descriptive statistics for the BFI-2 domain and facet scales as well as the mean-level gender differences based on the Spanish BFI-2 items. Women scored higher on all the domains except on Open-Mindedness. Also, many facets showed distinctive gender differences, with particularly large differences on the facets of Anxiety, Compassion, Respectfulness, and Responsibility. This is consistent with previous results from Soto and John (2017b) and previous classic research using other Big Five measures (e.g., Costa, Terracciano, & McCrae, 2001). The average effect size across all domains was $d=.27$, and across all facets was $d=.24$.

INSERT TABLE 1 AROUND HERE

Table 2 presents alpha reliability coefficients and interscale correlations for the BFI-2 domain scales and facet scales. As shown in Table 2, all domain scales had omega reliabilities above .83 with one exception (Agreeableness, .79). With respect to the facets, 5 had ω reliabilities above .79 (33%), 8 between .73 and .64 (53%), and 2

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between .55 and .60 (14%). This was expected, given the length of the facet scales, which is only four items long.

Scale intercorrelations yielded support to the domain and facet structure of the Spanish BFI-2. Absolute value correlations between the domain scales averaged .35 (see Table 2). With respect to absolute between-domain facet correlations averaged .27, whereas within domains, facet correlations averaged .65 (see Table 2).

BFI-2 Domain and Facet Structure

Following the procedures delineated by Soto and John (2017b), we tested the multidimensional structure at the facet and domain levels using confirmatory factor analysis (CFA). More specifically, a series of five CFA models were fit to the raw items for each of the Big Five domains. Fit indices for these models are presented in Table 3. The first model tested a single domain model allowing all 12 items of such domain to load on a single factor (first item loading was fixed at 1 for identification purposes). As expected, this model showed a poor fit for all domains (RMSEAs ranging from .118 to .131), therefore suggesting that models should incorporate further variables.

INSERT TABLE 3 AROUND HERE

Following the original procedures, we allowed the next two models to account for individual differences in acquiescence. The single domain plus acquiescence model allowed all 12 items of a given domain to load on both a domain factor and an acquiescence factor. A constraint was set so that all loadings on the acquiescence factor were fixed to 1, and the acquiescence factor was constrained to be orthogonal with the domain factor. According to Soto & John (2017b), these constraints ensured that differences in response style would be distinct from the personality content of the

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domain factor. We then fit a method model, in which the positive-keyed and negative-key items were allowed to load on two method factors, which were correlated. As expected, these two models yielded almost identical fit, and it remained unacceptable for all five domains (RMSEAs ranging from .115 to .131).

The fourth and fifth models both tested the three-faceted structure underlying each of the five BFI-2 domains. The three facets model posited three factors representing the three facet scales within each domain. Each item was freed to load only on a single facet factor, and the three facet factors were allowed to correlate between them. This model substantially improved the fit for all domains compared to the three previous models (RMSEAs ranging from .067 to .108). Finally, the model combining the three facets per domain plus an acquiescence factor (see figure 1) was tested. In this model, each item was allowed to load on both its corresponding facet factor as well as on the acquiescence factor, which was orthogonal to all of the facet factors. This model yielded acceptable fit indices for all domains (RMSEAs ranging from .06 to .07; CFIs ranging from .93 to .95; SRMRs around .04) but Agreeableness. For the latter, we could only obtain a fair fit ($RMSEA_A=.09$ and $CFI_A=.83$), although SRMR was below the cutoff value ($SRMR_A=.07$). These results are mostly consistent with the results of Soto and John (2017b) in indicating that the facet-level structure of the BFI-2 within each Big Five domain can be adequately modelled by three facet factors and an acquiescence method factor.

Domain-level structure was also studied using alternative methods, likewise Soto & John (2017b), and our analyses showed quite robust results across methods (congruence coefficients averaged 0.96), yielding support to a five factors structure at this level (see Supplementary Materials, tables SM1 and SM2).

Gender invariance of the BFI-2

An invariance analysis for gender was carried out on the fifth model (see Figure 1) for each domain. As can be seen in Table 4, configural invariance was supported for all domains: CFIs ranging from .834 to .946, RMSEAs ranging from .067 to .089, and SRMRs ranging from .040 to .072. Only Agreeableness showed a worse fit compared to the other domains, but nonetheless presented a fair fit. When equality constraints were placed on item factor loadings (metric invariance), the fit was not significantly worse (Extraversion: $\chi^2_E(9)=7.462$, $p=.589$, $\Delta CFI < .001$, $\Delta RMSEA = -.003$, $\Delta SRMR = .001$; Agreeableness: $\chi^2_A(9)=15.845$, $p=.070$, $\Delta CFI = -.003$, $\Delta RMSEA = -.003$, $\Delta SRMR = .004$; Conscientiousness: $\chi^2_C(9)=10.614$, $p=.303$, $\Delta CFI < .001$, $\Delta RMSEA = -.003$, $\Delta SRMR = .004$; Negative Emotionality: $\chi^2_N(9)=8.13$, $p=.520$, $\Delta CFI < .001$, $\Delta RMSEA = -.003$, $\Delta SRMR = .002$; Open-mindedness: $\chi^2_O(9)=8.751$, $p=.461$, $\Delta CFI < .001$, $\Delta RMSEA = -.003$, $\Delta SRMR = .001$). Scalar invariance was only supported by some of the indicators. Likelihood Ratio Tests rejected scalar invariance in all domains. However, it tends to overreject invariance. Therefore, we closely inspected ΔCFI and this inspection revealed that differences between models were $\delta -.005$ for all domains, indicating that latent means for men and women may be compared. Moreover, scalar invariance was held by $\Delta RMSEA$ (all $\delta .025$) and $\Delta SRMR$ (all $\delta .010$). Thus, given that sample sizes for both groups are unequal, and RMSEA and SRMR may be too sensitive to it, based on these results, we consider more appropriate to base our findings on the CFI.

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Summing up, the results suggest that three facets per domain plus an acquiescence factor adequately model the facet-level structure of the BFI-2 within each Big Five domain. Just agreeableness domain showed a fit below .9 according to CFI.

Intercorrelations between A facets are lower than intercorrelations between other domains' facets (see table 2). Additionally, a close inspection of individual facets' fit (see table SM3) revealed that Compassion shows the lower relative fit in A domain.

This could be a plausible explanation for this lower fit and further research is needed on this in the future. However, such as the SRMR still perform within adequate limits.

Furthermore, the test invariance analysis for gender overall shows that both the structure (i.e. factors) and the metrics (i.e. item loadings) are the same across men and women.

However, scalar invariance was no hold for Extraversion and Agreeableness. That means that men and women have different latent intercepts for these constructs, and direct comparison of scores would be biased.

Study 2

Study 2 was conducted to examine the temporal stability of the Spanish BFI-2 using a sample large enough to offer stable estimates of test-retest reliability coefficients.

Temporal stability is one of the basic measurement properties concerning personality assessment, given that personality traits tend to be stable over time. Consistent with our goals of developing the Spanish BFI-2, here we were interested in examining the test-retest reliability of the Spanish BFI-2.

Method

Participants and Procedure

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Study 2 analyzed data from two waves of research (T1 and T2). On 28 April, 2019 (T1), an online platform survey was made available for psychology students from the University of Barcelona to provide self-reports on the Spanish BFI-2, in exchange for course credits. In total, 367 students completed the survey². On June 13, 2019 (T2), we asked the students to complete the questionnaires again on the platform. For this second wave, 254 students completed the questionnaires. We identified a total of $N = 235$ students with data in both T1 and T2, therefore having a response rate of 64%. In both waves, surveys were available to students for a period of 3 days. We recorded a mean difference of 73.65 days ($SD = 5.58$) between both waves' observations (meaning roughly 2.5 months or ten weeks). Participants' age ranged from 18 to 70 (includes participants in a course for senior citizens), with most being in their early-twenties ($M_{age} = 21.05$ years, $Medianage = 19$ years, $SD = 6.22$) and the majority were female (83.5%).

Measures

Participants rated themselves using the Spanish BFI-2 items developed in Study 1.

Statistical Analyses

Participant data was analyzed using R and RStudio (see <https://osf.io/kp572/>). We determined test-retest reliability by computing intraclass correlation coefficients (ICCs), which serve as a relative index of reliability and represent the proportion of variance in a set of scores that is attributable to between-subjects variability between two measurement periods (Weir, 2005). We computed ICC by a two-way random effects model, absolute agreement, with two measurements, across 235 participants, which

² We removed 39 observations due to duplicated student identification numbers

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according to Shrout & Fleiss' (1979) convention, is ICC(2,2). ICCs were computed at the item, facet, and domain levels. Although the classic criteria for assessing the magnitude of the strength of test retest-agreement were provided by Landis and Koch (1977), we used the more conservative criteria suggested by Koo & Li (2016) that divides ICC range in four bins: from 0 to .5, poor correlation; higher than .5 to .75, moderate; higher than .75 to .9, good; and higher than .9 excellent correlation.

Results

In the current study, all personality domains showed substantial agreement between scores at T1 and at T2 (see table 5). Hence, ICCs ranged from .45 for Open-mindedness to .75 for Conscientiousness. Average ICC for the domains was of .67. Regarding the facets level, they were less stable over time, since ICCs were lower, and mostly in the range of moderate strength of association. They ranged from .45 for Anxiety or Aesthetic Sensitivity to .74 for Depression or Respectfulness, with a mean of .61.

INSERT TABLE 5 AROUND HERE

We then closely inspected items' temporal agreement within domains (see figure 2). With respect to Extraversion items, seven (58.3%) showed a moderate to good correlation, according to their 95% CIs, and one showed a good to excellent correlation. Regarding Agreeableness items, 10 (83.3%) showed a moderate to good correlation, Conscientiousness' items showed a substantial correlation, nine items (75%) showed a moderate to good correlation. Negative emotionality showed a fairly similar pattern (ten items (83%) showed a moderate to good correlation, and one showed a good to excellent correlation, according to Koo & Li's classification). Finally, for Open-

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mindedness items, 11 (91.7%) showed moderate to good correlation, whereas the remaining one showed a moderate correlation.

INSERT FIGURE 2 AROUND HERE

This pattern of test-retest reliabilities, with reliabilities lower for facets and higher for domains was essentially similar to the pattern found by Soto & John (2017b), although the ICC's absolute values were 17% lower in our sample. This discrepancy could be explained by the fact Soto & John (2017b) did use Pearson's r , whereas we used ICC (see table SM9 for a direct comparison). Pearson's r only tests the linear relationship between two variables (the same in two timepoints here), whereas ICC also looks at the absolute agreement of the scores (i.e. similarity of scores). Thus, we did not only test whether the rank of the participants was the same, but also whether their scores changed in absolute terms. Also, our re-test interval was a 25% longer on average (74 days versus 60), and this could also have affected our results. Even so, the figures presented in the current study generally indicate that the Spanish BFI-2 shows adequate test-retest reliability at the domain, facet, and item levels.

Study 3

Study 3 was conducted to explore the convergent validity of the Spanish BFI-2 by means of a nomological network and to develop a short and extra-short measure using an independent sample. To explore the nomological network, we administered eight other self-reports measures that are shown below, previously known to correlate either positively or negatively with the Big Five domains. Based on previous research (Ozer & Benet-Martínez, 2006; Soto, 2019), we hypothesize the following:

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- Convergent correlations between the Spanish BFI-2 Extraversion domain and Risk, Happiness and Optimism, and between Agreeableness and Honesty.
- Negative correlations between Negative Emotionality and Happiness and Optimism.
- Convergent correlations, in the median range of typical correlations between individual differences measures ($\sim .20$) between Trustworthiness and Agreeableness.
- Negative correlations between Extraversion and Agreeableness scores and Self-Constraint.
- Negative correlations between Agreeableness and Narcissism Admiration and Rivalry scores.

In addition, we were interested in developing an extra-short (SP-BFI-2-XS) and a short (SP-BFI-2-S) version of the Spanish BFI-2 following the criteria laid out by Soto & John (2017a). This procedure starts by (a) calculating the individual item's correlation with its total facet scale; (b) then the item's standardized loading on its facet factor is extracted using a bifactor confirmatory factor analysis (CFA) model of the facet scale; (c) followed by an estimation of the total information that each item provides of its facets trait, using item response theory (IRT); (d) continuing with authors' conceptual judgments regarding the extent to which each item's content represents the overall meaning of its facet scale; (e) followed by examining the item's retest reliability (from Study 2); after which the (f) item's pattern of loadings is inspected in an exploratory factor analysis (EFA) and a principal components analysis (PCA) of the preliminary SP-BFI-2-XS/ SP-BFI-2-S that extracted and varimax-rotated five dimensions; and finally

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(g) ensuring that the SP-BFI-2-XS/ SP-BFI-2-S include both true-keyed and false-keyed items within each Big Five domain.

Method

Participants and Procedure

Participants in study 3 were 419 students and community members recruited in the second wave of the International Situations Project. A complete procedure for the International Situations Project is available in Guillaume et al. (2016) and a more recent description in (Lee, Gardiner, Baranski, & Funder, 2020), but briefly, these participants were invited to fill in a standard internet survey comprising eight different self-report measures. Participants' age ranged from 17 to 50 years old ($M=19.73$, $SD=3.46$), being most of them women (85.2%) and almost entirely younger than 25 years old (97.1%). With respect to social status, on a self-report single item scale from low (1) to high status (10), participants ranged from 3 to 10 ($M=6.43$, $SD=1.27$). Regarding ethnicity, 90% described themselves as White/Caucasian, 5% as Hispanic/ Latino, 1% as Asian, and 5% did not report ethnicity. Regarding place of living, the majority lived in an urban area (75%), followed by suburban areas (18%), rural areas (6%) and remote rural (1%). All participants were residents of Spain at the moment of completing the survey.

Measures

All participants described themselves using the Spanish BFI-2 item set developed in Study 1. To describe the nomological network, a number of additional questionnaires were also administered on the basis that they are hypothetically relevant to the Big Five dimensions. They are described below.

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Risk-taking Behavior Item. Based on Mata, Josef & Hertwig (Mata, Josef, & Hertwig, 2016), this item was drawn from the World Values Survey (World Values Survey Association, 2014), and it contained the following phrase: *“How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?”*. Respondents were able to answer on a numeric scale ranging from 0 (Unwilling to take risks) to 10 (Fully prepared to take risks). This measure is sensitive to age decline, and men show greater risk propensity than women (Mata et al., 2016). Average test-retest reliability over a period of five years is .48 (Josef et al., 2016).

Subjective Happiness Scale (SHS: Lyubomirsky & Lepper, 1999). This 4-item Likert-type scale measures global subjective happiness by means of statements with which participants either self-rate themselves or compare themselves to others. The scale has an adequate unitary structure and temporal stability, showing moderate correlations with constructs such as self-esteem, depression, satisfaction, or neuroticism (Lyubomirsky & Lepper, 1999; Schwartz et al., 2002). The Spanish version (Extremera & Fernández-Berrocal, 2014) showed adequate psychometric properties, with a Chronbach's $\alpha = .81$, and a test-retest reliability of .72.

Interdependent Happiness Scale (IHS: Hidehumi Hitokoto & Uchida, 2015). The HIS is a 9-item 5-point Likert-type scale intended to measure interdependent happiness, a concept encompassing interpersonal harmony, quiescence, and ordinariness. Internal consistency was measured with Cronbach's α value in the original Japanese version ($\alpha = .77$) and the Spanish version (Hidefumi Hitokoto & Takahashi, 2020: $\alpha = .67$).

Self-Construal Scale (S-CS: Vignoles et al., 2016). This is a 42-item test that taps seven dimensions of self-construal. Nine-point response scales were used, keyed from 'Describes me exactly' to 'Does not describe me at all'. High scores on each dimension

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refer to the independence rather than interdependence. Due to space limit, we only applied three subscales: “Self-Expression vs. Harmony with others”, “Behavioral Consistency”, and “Self-Interest vs. Commitment to others”. These scales showed adequate internal consistencies in the original English version (Vignoles et al., 2016), and also in the Spanish version (Smith, Pérez Floriano, & Díaz Rivera, 2019), ranging from $\alpha = .57$ to $\alpha = .70$.

Trustworthiness Scale (Yamagishi et al., 2015). Originally, the scale had six items, but the last one was deleted (Yamagishi et al., 2015) and is no longer used. The Spanish version of the Trustworthiness Scale has five items with a five-point Likert scale, being 1 completely disagree and 5 completely agree. The scale contains items such as “*Most people are basically honest*”. Original version reliabilities ranged from .70 to .78 in different samples, whereas the Spanish version (Montoro, Shih, Román, & Martínez-Molina, 2014) showed a Cronbach’s α of .86.

Life Orientation Scale (Optimism) (Scheier, Carver, & Bridges, 1994). It is a 6-item measure of optimism drawn out of the 10 items that measure optimism and pessimism. 3 items measure optimism, 3 items measure pessimism, and 4 items serve as fillers. Respondents rate each item on a 4-point scale: 0 = strongly disagree, 1 = disagree, 2 = neutral, 3 = agree, and 4 = strongly agree. Both the original English version and the Spanish version (Ferrando, Chico, & Tous, 2002) showed adequate psychometric properties, analyzed via IRT.

HEXACO-Honesty-Humility subscale (Ashton & Lee, 2009). This scale is one of the subscales of the HEXACO-60 measure. It is 10-item long and comprises 4 facets (Sincerity, Fairness, Greed and Modesty), as well as a general score for Honesty/Humility. All items use a 1 to 5 response scale: 1 (strongly disagree) to 5

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(strongly agree). Internal consistency for the full scale in the original version ranged from .74 to .78 in different samples. The Spanish version (Romero, Villar, & López-Romero, 2015) showed both adequate internal consistency ($\alpha = .70$) and test-retest reliability ($r = .87$).

Narcissism Admiration and Rivalry Questionnaire (Back et al., 2013). In the present study, we used the Narcissism Admiration and Rivalry Questionnaire short scale (Leckelt et al., 2018), which is a 6-item 5-point Likert-type scale measuring both admiration and rivalry. Reliability scores for the English version were .84 for admiration and .70 for rivalry. Reliabilities for the Spanish version are reported in the current study.

Statistical Analyses

To begin the analyses of the present study, basic descriptives of all variables included were provided. Next, the development of the SP-BFI-2-XS and SP-BFI-2-S was planned following the procedures conducted by Soto & John (2017a), with the novelty of splitting the sample collected for this study into two subsamples: (a) a calibration sample, where CFA and IRT-analyses were conducted, and (b) a validation sample, where EFA was performed. Split was absolutely at random (descriptives of both subsamples are available upon request). Finally, convergent validity was examined through correlational analyses of a nomological network, along with the comparison of the precision of shorter scales. All analyses were conducted in R software. In order to ensure unidimensionality for IRT analyses and obtain factor loadings for each facet, a bifactor CFA was fitted, one model per facet. For all models, we allowed items in a facet to load on two general factors, one for the facet (with freed factor loadings, except the first for identification purposes), and the other for an acquiescence factor (with all

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loadings fixed to 1). IRT-based methods were used to shorten scales. As items' responses are polytomous and ordered, with scoring categories ranging from one to five, we used the Samejima's graded response model (GRM) to fit the item responses, hence the assumption of unidimensionality tested above. If facets are sufficiently unidimensional, the application of unidimensional IRT analysis can be granted. Maximum likelihood method was used to estimate the GRM item parameters. We used the Item information function, $I(\theta_j)$, that indicates the precision to which each item measures through the different facet levels, to select the best items for each facet.

An exploratory factor analysis (EFA) with the selected items was conducted using the calibration sample, expecting to retrieve a five-factor model for both the SP-BFI-2-XS and SP-BFI-2-S. We used a random-intercept EFA (RI-EFA) for different reasons: 1) simple CFAs or PCAs fail to retrieve complex structures such as the big five (Aichholzer, 2014); 2) RI-EFA with orthogonal rotation has shown to perform better in the presence of acquiescence or uniform response bias (Aichholzer, 2014).

Results

Descriptives, reliabilities and nomological network for the BFI-2

Table 6 shows descriptive statistics for the scales employed in Study 3 as well as the mean-level gender differences. Regarding the BFI-2 facets and domains, the average levels were very similar to Study 1. Also, the pattern of gender differences was fairly similar, with women scoring higher on Negative Emotionality, Agreeableness, Conscientiousness, while both genders did not differ on Extraversion or Open-mindedness. Again, many facets showed distinctive gender differences, with differences largest for the Anxiety, Compassion, Trust, and Responsibility facets. The average

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effect size across both genders for domains and for facets was $d=.26$. Reliabilities were in the same range than in Study 1 (although only ω was computed in this study, all domains showed internal consistencies $\epsilon .77$). With respect to the remaining variables used in Study 3, women scored significantly higher on Behavioral Consistency, Modesty-Humility, Fairness, Greed, and Modesty, whereas men scored higher on Self-Interest, Narcissistic Admiration, and Narcissistic Rivalry. There were no gender differences on Interdependent Happiness Scale, Self-Expression, Trustworthiness, Optimism, Sincerity, Risk and Subjective Happiness. Reliabilities tend to be lower than BFI-2 (average $\omega=.70$), but this seems reasonable since they are very short scales.

INSERT TABLE 6 AROUND HERE

Our first goal in Study 3 was to develop the SP-BFI-2-XS and the SP-BFI-2-XS versions of the BFI-2. Unidimensionality for all facets was confirmed by means of CFAs (see Supplementary Material, Table SM3). Two of the facets (Compassion and Organization) did not fit in absolute terms, but their relative fit was adequate. Parameters of the IRT models can be found in Table SM4 (see Supplementary Material). Like in the original English version, the criteria outlined above successfully converged to identify one item per facet in the majority of instances. For eight out of the 15 facets, these criteria consistently suggested one particular item for selection. For the remaining facets, two (for Assertiveness, Compassion, Depression, and Intellectual Curiosity; two coinciding with the original English version) or three (for Productiveness, Responsibility, and Aesthetic Sensitivity) items were identified as tenable items for an extra-short version. In those cases where empirical criteria were not clear, following Soto & John's (2017a) procedure, we finalized our selection through discussion of each item's empirical and conceptual strengths and weaknesses. The

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complete set of 15 items selected for the SP-BFI-2-XS and SP-BFI-S is provided in Supplementary Material (see <https://osf.io/kp572/>). In order to develop the SP-BFI-2-S form, we followed the same approach as Soto & John (2017a), and we added a second item per facet to complement the SP-BFI-2-XS. We aimed to combine the criteria above, and whenever it was possible, we balanced the wording of the items in order to sustain the test's ability to deal with acquiescence.

INSERT FIGURE 3 AROUND HERE

Domain- and facet-level structure of the BFI-2 short forms

After these items were selected we submitted both forms to a random-intercept exploratory factor analysis with bi-geomin orthogonal rotation to examine the domain-level structure of the SP-BFI-2-S and SP-BFI-2-XS. This procedure extracted the expected five factors in both versions. The factor loadings from these analyses are shown in Table 8 (SP-BFI-2-XS) and 9 (SP-BFI-2-S). As can be seen, for both short forms almost all items had their highest loading on the expected factor in both calibration and validation samples. This pattern is clearer in the short form than in the extra-short form. There is only one item in both forms (i.e. “is original, comes up with new ideas”) that loads importantly on a factor different than expected. For the BFI-2-XS, in each sample the absolute primary loadings averaged 0.58 or 0.45 respectively (total range 0.08-0.79), whereas the absolute secondary loadings averaged 0.09 for the calibration sample and 0.13 for the validation sample (total range = 0.00-0.65). With respect to the BFI-2-S, in each sample the absolute primary loadings averaged 0.57 and 0.54 (total range = 0.11–0.87), whereas the absolute secondary loadings averaged 0.11 for both samples (total range = 0.00–0.50). Like Soto & John (2017a), we also found evidence of the utility of modelling acquiescence variance, since loadings on the

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acquiescence method factor were generally small but not negligible, averaging 0.24 in the calibration sample and 0.18 in the validation sample for the extra-short form (total range = 0.01–0.53). Regarding the short version, loadings on the acquiescence factor in the calibration sample averaged 0.25 and 0.23 in the validation sample (total range = 0.08–0.74). Congruence coefficients, which show the replicability of factor structure across samples, were high ($M=0.88$), with the exception of Agreeableness (0.64) for the SP-BFI-2-S. The results for the extra-short version were fairly similar ($M=0.86$), except for Negative Emotionality, which showed less congruence between samples (0.53).³

INSERT TABLE 7 AROUND HERE

INSERT TABLE 8 AROUND HERE

Following the exploration of the multidimensional structure of the SP-BFI-2-XS and SP-BFI-2-S, we also focused on the part-whole correlations, and on omega reliabilities in the two subsamples we used (see Table 9). Part-whole correlations between the SP-BFI-2-XS domain scales and the full Spanish BFI-2 domain scales in each subsample was either 0.88 or 0.86 on average (total variance for the three samples = 0.77–0.74), and correlations between the six-item BFI-2-S domain scales and the full BFI-2 domain scales averaged 0.95 and 0.93 for each sample (total range = 0.87–0.97). These findings indicate that our conditions for empirical and rational item selection successfully yielded short forms that accurately reflect the meaning and overall significance of the

³ John & Soto (2017) also explored the factor structure of the short and extra-short versions of the BFI-2 using alternative methods, such as PCAs with varimax rotation and random intercept EFAs with direct oblimin rotation. In order to ensure replicability of our results, we also performed alternative analyses, PCAs with varimax rotation and bi-factor Exploratory Structural Equation Modeling using the SLiD algorithm (García-Garzón, Nieto, Garrido, & Abad, 2020: https://slidapp.shinyapps.io/SLiD_app/). The results of these analyses are reported in the Supplementary Material Tables SM5–SM8. Generally speaking, the results of these different approaches are quite similar between them. Congruence coefficients between the results of these analyses and the ones presented in Tables 8 and 9 were at least .93. Thus, like John & Soto (2017), we consider these results to be quite robust across methods.

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BFI-2 domains, with the BFI-2-S offering better representation (as anticipated) than the BFI-2-XS.

In each subsample, the BFI-2-S domain scale omega reliability averaged either 0.86 or 0.84 (total range = 0.77-0.89). As for the BFI-2-XS domain scales, in each sample, omegas averaged between 0.62 and 0.60 (total range = 0.51–0.72). These findings show that both short versions are sufficiently reliable, with the BFI-2-S giving greater reliability than the BFI-2-XS. It is important to note here that both short forms retained a large amount of variance while shortening the administration time at a very convenient cost/benefit rate. The list of items of the resulting short and extra-short versions of the BFI-2-SP is available in Appendix B.

INSERT TABLE 9 AROUND HERE

Our second goal was to examine the evidences of convergent validity of the Spanish version of the BFI-2. Table 10 shows the correlations between the Spanish BFI-2 domains and facets and the other administered scales. As expected, all five domains differentially correlated with the other scales, measuring either similar or dissimilar constructs. Specifically looking at large effect convergent positive associations at the domain level, Extraversion correlated positively with Risk ($r=.37$), Subjective Happiness ($r=.48$), Interdependent Happiness ($r=.30$), Behavioral Consistency ($r=.36$), Optimism ($r=.39$), and Rivalry ($r=.33$). Agreeableness showed a positive association with Trustworthiness ($r=.39$) and Honesty-Humility ($r=.33$). Open-mindedness was positively associated with Subjective Happiness ($r=.37$), Behavioral Consistency ($r=.32$), and Narcissistic Rivalry ($r=.32$). Conscientiousness and Negative Emotionality did not show large convergent associations at the domain level with the other measures, but did so when inspecting these associations at the facet level (e.g.

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Conscientiousness and Fairness, $r=.23$, see Table 7). Regarding negative associations at the domain level, Extraversion negatively correlated with Self-Expression ($r=-.32$). Agreeableness was negatively associated to Self-Interest ($r=-.40$) and Narcissistic Admiration ($r=-.35$). Negative Emotionality was negatively associated with both measures of happiness, Subjective Happiness ($r=-.68$) and Interdependent Happiness ($r=-.54$). With respect to Open-mindedness, it was associated with Self-Expression ($r=-.30$). Conscientiousness only showed moderate associations with the nomological network at the facet level and were small to moderate in size. These results cast promising exploratory evidence with respect to the construct validity of the Spanish BFI-2.

INSERT TABLE 10 AROUND HERE

Moreover, we examined how the short scales impacted on the correlations with other subscales. Figure 4 shows the averaged absolute correlations between across the nomological network explored in this study (see tables SM10 and SM11 for details on specific scales and facets). In general, E and A show the same pattern, with no much loss between the full scale and the short scale, whereas there is a drop in the extra-short scale. C and N show a progressive drop in the averaged correlation sizes as the length of scale decreases. Finally, O shows a meaningful drop when the short or the extra-short scales are used instead of the full scale.

INSERT FIGURE 4 AROUND HERE

General Discussion

A Spanish translation of the BFI-2 and its abbreviated versions, the SP-BFI-2-S and the SP-BFI-2-XS, was developed and validated in the present research. First, we translated

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and back-translated until semantic equivalence was found for the set of 60 items of the Spanish BFI-2, and investigated the measure's multidimensional structure and measurement properties. Second, using an independent sample, we tested temporal stability of this measure over a period of 2.5 months. Third, in a new study, we tested the nomological network of the Spanish BFI-2, as well as the measurement properties of its abbreviated versions. The Spanish BFI-2's domain- and facet-level structure mirrored the expected hierarchical structure of the BFI-2, with three facets nested within each Big Five domain. The Spanish BFI-2 measurement properties also corresponded to the original English BFI-2 measurement properties (Soto & John, 2017b), as did the intercorrelations of the domains and facets. Good test-retest reliability is shown for the items, facets, and domains. In addition, the correlations between the Spanish BFI-2 and the measures of Happiness, Risk, Trustworthiness, Optimism, Honesty and Narcissism provide evidence for the construct validity of the Spanish BFI-2. The preliminary findings concerning the measuring properties of the Spanish abbreviated scales, BFI-2-S and BFI-2-XS, were also comparable with the original measures in English.

Broader Implications

Our findings have broader implications for personality assessment across-culture. We found that even though the meaning of some items is semantically equivalent, some items had primary loads on factors different from expected. For instance, in Spanish, the item “tends to be quiet”, which is primarily associated to low extraversion, can also mean “relaxed” depending on the context, although this only happened in one sample. These cross-loadings, though, were not higher than other cross-loadings present in other adaptations, such as the Dutch one (Denissen et al., 2020). Interestingly, we also found

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a consistent association between one Open-mindedness item (i.e. “Is original, comes up with new ideas”) and Extraversion across samples. Thus, it seems that, in Spanish, expressing your ideas may be a core aspect of Extraversion, rather than Open-mindedness. This is interesting because it actually points out at how different cultures conceptualize personality traits (Benet-Martínez & Oishi, 2008; Schmitt et al., 2007). It may be necessary to revise some formulations of items in order to obtain improved measurement properties and a simpler multidimensional framework, with less cross-loadings. Most importantly, we should explore whether acquiescence is equally understood or conceptualized across cultures.

Another important implication is related to the use of long or brief measures of personality. This is a relevant topic that has deserved interest recently in the personality assessment field (Sleep, Lynam & Miller, 2021). Our findings have shown that it is possible to capture an important amount of variance using shortened scales without a meaningful drop in the reliability and content validity. Although it is always preferable to apply longer versions, as Sleep et al. (2021) suggest, whenever it is not possible, shorter versions still catch relevant variance. Needless to say, the attenuation of the correlations between external scales and the Big Five traits could be partially due to the increase in the restriction of the range of the scale as it is shortened. We also found that this attenuation is relative to Big Five domains. All these elements should be taken into account in the trade-off between fidelity and time of application in large data panels.

Limitations and Future Directions

There are some major strengths in the current study, including its translation method involving both language and subject matter experts, and its consideration of several criteria for reliability and validity. The present research, however, still has certain

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caveats that illuminate avenues for future studies. Firstly, the composition of the samples. They mostly consisted of students (in the case of Study 2, students exclusively). The use of psychology students in scientific research has often been criticized as bringing misleading results (Henrich, Heine, & Norenzayan, 2010), and they often appear to have distinct personality profiles compared to other majors (Vedel, 2016). As most of our participants were psychology students, and as a group, they seem to have high levels of Negative Emotionality and Open-Mindedness (Vedel, 2016), the mean values in the current research, and particularly regarding these characteristics, are most likely to vary from the mean values in the general population. Consequently, the mean values of the Big Five domains in the current studies cannot be considered as norms, even for students. Rather, they are a preliminary proxy and further research is needed in order to establish these norms. In addition, future research can analyze the generalizability of the findings for the Spanish BFI-2 and its abbreviated forms in more diverse samples. Related to the composition of the sample is the fact that a high proportion of participants were women, and this is a major limitation for the generalization of our findings to the general population. Although we found evidence of gender invariance in the questionnaire for the majority of the scales, there were differences for Extraversion and Agreeableness that should be further explored in future research, since these differences could have important effects (Costa, Terracciano, & McCrae, 2001).

The second caveat applies to the generalizability of the test-retest reliability and the construct validity identified in the present studies. Here we provided preliminary evidence, but this is an important issue, as well as the development of norms. Future studies might also compare the properties of the Spanish BFI-2 with other Spanish Big

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Five measures, such as the Spanish IPIP-NEO (Cupani, Pilatti, Urrizaga, Chincolla, & Richaud, 2014).

Another drawback is that peer-reported data for either the BFI-2 or the validity criteria were not included in our analysis. Future research with the Spanish BFI-2 may then investigate the self-peer agreement, as well as assess the validity with criteria reported by peers. The limited set of validity criteria we used, which relied primarily on happiness, imposed by the secondary analysis of data obtained in other studies, is another important limitation. Big Five personality traits have been shown to predict a broad range of cognitive, emotional and behavioral variables (e.g., Ozer & Benet-Martínez, 2006; Soto, 2020). Our focus on selected happiness measures allowed us to examine this criterion domain in greater detail; however, many other variables are still unexplored. Further research, including other criteria, may provide more information about how the Spanish BFI-2 contributes to a wide variety of psychological factors and how useful it can be to predict important life outcomes.

Also, the findings concerning the measurement properties of the Spanish BFI-2-S and BFI-2-XS should be viewed with caution. In contrast with other adaptations (Danish...), we developed the short version using an independent sample, and employed both a calibration and a validation sample. However, although our findings were consistent and robust across samples and methods, they need to be replicated and extended. Therefore, further confirmation of these abbreviated measures is required. Finally, we echo the call by Soto and John (2017a) for large-scale studies with high statistical power to test the practical significance of abbreviated forms in terms of facet-level measurement.

Conclusion

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Altogether, our findings show that the Spanish BFI-2 is a reliable and valid measure of the Big Five domains and their facets. The validity of the Spanish translation is confirmed by a high degree of similarity between the measurement properties of the Spanish BFI-2 and the English BFI-2. In comparison, the multidimensional structure of the Spanish measures mirrors that proposed by the BFI-2 of the Big Five and its facet-level structure. The present research also indicates that the Spanish BFI-2-S and BFI-2-XS have close measurement properties to their English-language counterparts, but further confirmation is required to validate these preliminary findings. Translations such as the current one would ideally extend BFI-2 to a wide variety of countries and cultures, offering a common conceptual and measurement framework for the development of cross-cultural personality studies.

Appendix A. The SP-BFI-2

A.1. The Spanish BFI-2 form and scoring information (in Spanish). Further information and scoring key is available at <https://osf.io/kp572/>.

A continuación, se le presentan una serie de afirmaciones sobre las que usted puede estar de acuerdo o no. Por ejemplo, ¿está de acuerdo en que usted es alguien a quién le gusta pasar rato con los demás? Por favor, escriba el número que corresponda al lado de cada frase para indicar en qué medida está de acuerdo o en desacuerdo con las siguientes afirmaciones.

1	2	3	4	5
Muy en desacuerdo	Algo en desacuerdo	Neutral, sin opinión	Algo de acuerdo	Muy de acuerdo

Yo soy alguien ...

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1	_ Abierto/a, sociable	31	_ A veces tímido/a, introvertido/a
2	_ Compasivo/a, con un gran corazón	32	_ Servicial y generoso/a con los demás
3	_ Que tiende a ser desorganizado/a	33	_ Que mantiene todo limpio y ordenado
4	_ Relajado/a, que gestiona bien el estrés	34	_ Que se preocupa mucho
5	_ Con pocos intereses artísticos	35	_ Que valora el arte y la belleza
6	_ Con una personalidad asertiva	36	_ A quien le es difícil influir en los demás
7	_ Respetuoso/a, que trata a los demás con respeto	37	_ Que a veces es grosero/a con los demás
8	_ Que tiende a ser perezoso/a	38	_ Eficiente, que consigue que las cosas se hagan
9	_ Que se mantiene optimista después de sufrir un contratiempo	39	_ Que a menudo se siente triste
10	_ Que siente curiosidad por gran variedad de cosas	40	_ Complejo/a, de pensamientos profundos
11	_ Que raramente se siente emocionado/a o entusiasmado/a	41	_ Lleno/a de energía
12	_ Que tiende a buscar los defectos de los demás	42	_ Que desconfía de las intenciones de los demás
13	_ Formal, constante	43	_ Fiable, con el/la que siempre se puede contar
14	_ Variable, con notables cambios de humor	44	_ Que controla sus emociones
15	_ Ingenioso/a, que busca formas inteligentes de hacer las cosas	45	_ Que tiene dificultad para imaginarse las cosas
16	_ Que tiende a estar callado/a	46	_ Hablador/a
17	_ Que siente poca compasión hacia los demás	47	_ Que puede ser frío/a e insensible
18	_ Metódico/a, a quien le gusta mantenerlo todo en orden	48	_ Que lo deja todo hecho un lío, que no limpia
19	_ Que puede ponerse tenso/a	49	_ Que raramente se siente ansioso/a o miedoso/a
20	_ Fascinado por el arte, la música o la literatura	50	_ Que considera que la poesía y el teatro son aburridos
21	_ Dominante, que actúa como líder	51	_ Que prefiere que otros asuman la responsabilidad
22	_ Que empieza discusiones con los demás	52	_ Educado/a, cortés con los demás
23	_ A quien le cuesta empezar las tareas	53	_ Tenaz, que trabaja hasta terminar la tarea
24	_ Que se siente seguro/a, cómodo/a consigo mismo/a	54	_ Que tiende a sentirse deprimido/a, melancólico/a
25	_ Que evita conversaciones intelectuales y filosóficas	55	_ Con poco interés por ideas abstractas
26	_ Menos activo/a que otras personas	56	_ Que muestra mucho entusiasmo
27	_ Comprensivo/a con los demás	57	_ Que piensa bien de la gente

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28	_ Que puede ser algo descuidado/a	58	_ Que a veces se comporta de manera irresponsable
29	_ Emocionalmente estable, que no se altera con facilidad	59	_ Temperamental, que se exalta fácilmente
30	_ Con poca creatividad	60	_ Original, que aporta ideas nuevas
Por favor, compruebe: ¿Escribió un número al frente de cada frase?			

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Appendix B. The SP-BFI-2-S and SP-BFI-2-XS

B.1. The Spanish BFI-2 short forms and scoring information (in Spanish). Further information and scoring key is available at <https://osf.io/kp572/>.

A continuación, se le presentan una serie de afirmaciones sobre las que usted puede estar de acuerdo o no. Por ejemplo, ¿está de acuerdo en que usted es alguien a quién le gusta pasar rato con los demás? Por favor, escriba el número que corresponda al lado de cada frase para indicar en qué medida está de acuerdo o en desacuerdo con las siguientes afirmaciones.

1	2	3	4	5
Muy en desacuerdo	Algo en desacuerdo	Neutral, sin opinión	Algo de acuerdo	Muy de acuerdo

Yo soy alguien ...

1	_ Compasivo/a, con un gran corazón	16	_ Abierto/a, sociable
2	_ Relajado/a, que gestiona bien el estrés	17	_ Que tiende a ser desorganizado/a
3	_ Respetuoso/a, que trata a los demás con respeto	18	_ Con pocos intereses artísticos
4	_ Formal, constante	19	_ Que se mantiene optimista después de sufrir un contratiempo
5	_ Que tiende a estar callado/a	20	_ Que siente curiosidad por gran variedad de cosas
6	_ Fascinado/a por el arte, la música o la literatura	21	_ Variable, con notables cambios de humor
7	_ Dominante, que actúa como líder	22	_ Que siente poca compasión hacia los demás
8	_ Emocionalmente estable, que no se altera con facilidad	23	_ A quien le cuesta empezar las tareas
9	_ Que mantiene todo limpio y ordenado	24	_ Menos activo/a que otras personas
10	_ Lleno/a de energía	25	_ Que puede ser algo descuidado/a
11	_ Tenaz, que trabaja hasta terminar la tarea	26	_ Con poca creatividad
12	_ Que tiende a sentirse deprimido/a, melancólico/a	27	_ Que se preocupa mucho

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13	_ Con poco interés por ideas abstractas	28	_ A quien le es difícil influir en los demás
14	_ Que piensa bien de la gente	29	_ Que a veces es grosero/a con los demás
15	_ Original, que aporta ideas nuevas	30	_ Que desconfía de las intenciones de los demás
Por favor, compruebe: ¿Escribió un número al frente de cada frase?			

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Figure 1. Illustration of the three facets plus acquiescence CFA model (Study 3).
Acq=Acquiescence. *DiagrammeR* code is available at <https://osf.io/kp572/>.

Figure 2. Item stability coefficients. Horizontal bars the 95% confidence interval of the point ICC estimate.

Figure 3. Examples of BFI-2 Items' Characteristic Curves and SE Curves.

Figure 4. Figure 4. Averaged correlations by type of scale: Full scale, Short scale (S) or Extra-Short Scale (XS).

Table 1.

Descriptive Statistics for the Spanish BFI-2 Domains and Facets (Study 1)

Domain / Facet	Men		Women		Combined		Gender <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1. Extraversion	3.30	0.57	3.44	0.53	3.42	0.54	0.26
2. Sociability	3.23	0.95	3.39	0.89	3.36	0.90	0.17
3. Assertiveness	3.36	0.64	3.37	0.65	3.37	0.65	0.01
4. Energy Level	3.55	0.76	3.74	0.68	3.71	0.70	0.28
5. Agreeableness	3.69	0.55	3.91	0.46	3.87	0.48	0.45
6. Compassion	3.85	0.66	4.10	0.59	4.06	0.61	0.42
7. Respectfulness	3.79	0.68	4.01	0.57	3.97	0.60	0.37
8. Trust	3.44	0.70	3.62	0.63	3.58	0.64	0.27
9. Conscientiousness	3.26	0.64	3.43	0.66	3.40	0.66	0.26
10. Organization	3.28	0.97	3.38	0.97	3.36	0.97	0.10
11. Productiveness	3.24	0.71	3.41	0.72	3.38	0.72	0.24
12. Responsibility	3.27	0.63	3.51	0.64	3.47	0.64	0.37
13. Negative Emotionality	2.95	0.77	3.17	0.69	3.13	0.71	0.32
14. Anxiety	3.29	0.85	3.68	0.70	3.61	0.74	0.53
15. Depression	2.77	0.91	2.81	0.90	2.81	0.90	0.05
16. Emotional Volatility	2.78	0.94	3.03	0.86	2.98	0.88	0.29
17. Open-mindedness	3.86	0.63	3.90	0.57	3.89	0.58	0.07
18. Intellectual Curiosity	4.05	0.70	4.06	0.62	4.06	0.64	0.02
19. Aesthetic Sensitivity	3.65	0.96	3.87	0.84	3.83	0.87	0.25
20. Creative Imagination	3.88	0.70	3.77	0.65	3.79	0.66	-0.17
Sample size	182		818		1,000		

Note. Gender *d* = Cohen's *d* for the mean-level difference between men and women, with

positive values indicating higher scores for women; differences $\geq .16$ are significant at $p < .05$.

Combined values in the student sample are estimated for the full sample.

Table 2.

Reliability coefficients and intercorrelations of the Spanish BFI-2 domains and facets

Domain / Facet	α	ω	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Extraversion	.77	.83																			
2. Sociability	.84	.85	.86																		
3. Assertiveness	.57	.58	.59	.41																	
4. Energy Level	.70	.73	.80	.50	.35																
5. Agreeableness	.77	.79	.25	.15	.01	.36															
6. Compassion	.61	.65	.26	.19	.06	.31	.77														
7. Respectfulness	.61	.65	.09	-.01	-.05	.23	.78	.41													
8. Trust	.62	.64	.23	.17	.02	.30	.80	.42	.43												
9. Conscientiousness	.86	.86	.30	.14	.28	.30	.25	.22	.26	.10											
10. Organization	.86	.87	.18	.06	.19	.17	.16	.16	.17	.05	.87										
11. Productiveness	.69	.70	.39	.23	.31	.40	.20	.15	.20	.12	.81	.50									
12. Responsibility	.58	.58	.22	.09	.23	.22	.29	.27	.32	.09	.84	.60	.60								
13. Negative Emotionality	.88	.88	-.28	-.21	-.17	-.31	-.30	-.04	-.28	-.39	-.13	-.04	-.18	-.14							
14. Anxiety	.73	.73	-.11	-.09	-.07	-.12	-.12	.11	-.12	-.26	.04	.06	-.00	.03	.81						
15. Depression	.81	.82	-.47	-.39	-.28	-.48	-.28	-.10	-.20	-.34	-.18	-.07	-.26	-.16	.85	.53					
16. Emotional Volatility	.80	.81	-.11	-.04	-.07	-.16	-.35	-.08	-.37	-.37	-.17	-.08	-.16	-.21	.86	.57	.58				
17. Open-mindedness	.84	.84	.21	.09	.26	.25	.16	.13	.10	.13	.03	-.01	.10	-.01	.03	.07	-.04	.04			
18. Intellectual Curiosity	.66	.66	.16	.05	.21	.20	.12	.11	.08	.11	.01	-.02	.08	-.01	.07	.11	.02	.07	.80		
19. Aesthetic Sensitivity	.83	.84	.10	.03	.13	.14	.16	.12	.12	.15	-.01	-.03	.05	-.03	.05	.06	.03	.04	.85	.52	
20. Creative Imagination	.70	.72	.27	.16	.30	.29	.08	.10	.05	.05	.07	.03	.12	.02	-.06	-.01	-.15	-.00	.76	.45	.44
<i>Average Domains</i>	.82	.85																			
<i>Average Facets</i>	.71	.72																			

Note. N = 1,000; Mean (Average) reliabilities are bolded and italicized. Correlations significant at $p < .05$ are boldfaced. Interdomain

correlations are shadowed in light gray. See Table 2 and 3 in Soto and John (2017) for corresponding values of the original measure. α =

Cronbach's Alpha; ω = McDonald's Omega.

Table 3.

Model fit indices for confirmatory factor analyses of the Spanish BFI-2 items

Model	χ^2	df	CFI	SRMR	RMSEA [90% CI]
Extraversion					
Single domain	862.788	54	.774	.079	.122 [.115, .130]
Single domain plus acquiescence	862.774	53	.774	.079	.124 [.116, .131]
Positive and negative items	862.110	53	.774	.080	.124 [.116, .131]
Three facets	300.078	51	.930	.049	.070 [.062, .078]
Three facets plus acquiescence	293.013	50	.932	.048	.070 [.062, .078]
Agreeableness					
Single domain	764.128	54	.713	.084	.115 [.108, .122]
Single domain plus acquiescence	662.457	53	.754	.078	.107 [.100, .115]
Positive and negative items	666.341	53	.753	.081	.108 [.100, .115]
Three facets	643.440	51	.761	.087	.108 [.100, .115]
Three facets plus acquiescence	472.571	50	.829	.075	.092 [.084, .100]
Conscientiousness					
Single domain	800.169	54	.823	.074	.118 [.110, .125]
Single domain plus acquiescence	749.186	53	.835	.071	.115 [.107, .122]
Positive and negative items	771.431	53	.830	.073	.116 [.109, .124]
Three facets	376.202	51	.923	.047	.080 [.072, .088]
Three facets plus acquiescence	265.373	50	.949	.039	.066 [.058, .074]
Negative Emotionality					
Single domain	980.106	54	.805	.070	.131 [.124, .138]
Single domain plus acquiescence	963.117	53	.808	.070	.131 [.124, .138]
Positive and negative items	924.398	53	.816	.074	.128 [.121, .136]
Three facets	333.778	51	.940	.051	.074 [.067, .082]
Three facets plus acquiescence	271.435	50	.953	.048	.067 [.059, .074]
Open-mindedness					
Single domain	906.597	54	.775	.082	.126 [.119, .133]
Single domain plus acquiescence	905.615	53	.775	.082	.127 [.120, .134]
Positive and negative items	902.830	53	.776	.083	.127 [.119, .134]
Three facets	277.344	51	.940	.045	.067 [.059, .074]
Three facets plus acquiescence	244.045	50	.949	.043	.062 [.055, .070]

Note. *df* = degrees of freedom; CFI = comparative fit index; SRMR = standardized root mean

square residual; RMSEA = root mean square error of approximation; CI = confidence interval.

Bolded: best-fitting model.

Table 4.

Model comparisons for gender invariance

Model – parameters constrained to equality	Compare to model	χ^2	df	$\Delta\chi^2$	Δdf	$\Delta\chi^2$ sig.	CFI	ΔCFI	RMSEA	$\Delta RMSEA$	SRMR	$\Delta SRMR$
Extraversion												
1. Unconstrained (configural)		349.452	100				.931		.071		.048	
2. Item factor loadings (metric)	1	356.914	109	7.462	9	0.589	.931	<.001	.067	-0.003	.049	0.001
3. Item intercepts (scalar)	2	410.806	117	53.893	8	<.001	.918	-0.013	.071	0.003	.052	0.003
Agreeableness												
4. Unconstrained (configural)		500.502	100				.834		.089		.072	
5. Item factor loadings (metric)	4	516.347	109	15.845	9	0.070	.831	-0.003	.086	-0.003	.076	0.004
6. Item intercepts (scalar)	5	599.200	117	82.853	8	<.001	.800	-0.031	.091	0.004	.078	0.002
Conscientiousness												
7. Unconstrained (configural)		326.347	100				.946		.067		.040	
8. Item factor loadings (metric)	7	336.961	109	10.614	9	0.303	.946	<.001	.065	-0.003	.043	0.004
9. Item intercepts (scalar)	8	359.703	117	22.742	8	0.004	.942	-0.003	.064	<.001	.045	0.002
Negative Emotionality												
10. Unconstrained (configural)		343.023	100				.949		.070		.046	
11. Item factor loadings (metric)	10	351.161	109	8.1381	9	0.520	.949	<.001	.067	-0.003	.048	0.002
12. Item intercepts (scalar)	11	380.720	117	29.558	8	<.001	.944	-0.005	.067	<.001	.050	0.002
Openness to Experience												
13. Unconstrained (configural)		322.167	100				.942		.067		.045	
14. Item factor loadings (metric)	13	330.919	109	8.751	9	0.461	.942	<.001	.064	-0.003	.046	0.001
15. Item intercepts (scalar)	14	356.624	117	25.705	8	0.001	.938	-0.005	.064	<.001	.048	0.001

Note. df = degrees of freedom; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; sig. = p-value.

Table 5.

Intraclass Correlation Coefficients between Time 1 and Time 2 (Study 2)

Domain / Facet	ICC	95% Lower CI	95% Upper CI
1. Extraversion	.65	.57	.72
2. Sociability	.73	.67	.78
3. Assertiveness	.51	.40	.61
4. Energy Level	.51	.39	.60
5. Agreeableness	.74	.68	.79
6. Compassion	.62	.53	.70
7. Respectfulness	.74	.67	.79
8. Trust	.68	.60	.74
9. Conscientiousness	.75	.69	.80
10. Organization	.51	.40	.61
11. Productiveness	.66	.58	.73
12. Responsibility	.72	.66	.78
13. Negative Emotionality	.65	.56	.71
14. Anxiety	.45	.31	.55
15. Depression	.74	.68	.79
16. Emotional Volatility	.59	.49	.67
17. Open-mindedness	.54	.43	.63
18. Intellectual Curiosity	.49	.37	.59
19. Aesthetic Sensitivity	.45	.31	.55
20. Creative Imagination	.70	.63	.76
Average Domains	.67		
Average Facet	.61		

Note. ICC=Intraclass Correlation Coefficient; CI=Confidence Interval.

Table 6.

Descriptive Statistics for the variables included in Study 3

BFI-2	Men		Women		Combined		Gender <i>d</i>	Cronbach's α
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
1. Extraversion	3.44	0.58	3.37	0.50	3.38	0.51	-0.13	0.74
2. Sociability	3.52	0.93	3.35	0.88	3.37	0.89	-0.19	0.84
3. Assertiveness	3.42	0.62	3.27	0.66	3.29	0.66	-0.23	0.59
4. Energy Level	3.63	0.77	3.66	0.65	3.66	0.67	0.05	0.70
5. Agreeableness	3.64	0.54	3.90	0.44	3.86	0.46	0.57	0.76
6. Compassion	3.80	0.71	4.11	0.55	4.06	0.59	0.53	0.60
7. Respectfulness	3.74	0.61	3.95	0.55	3.92	0.56	0.38	0.56
8. Trust	3.38	0.80	3.63	0.61	3.60	0.65	0.40	0.66
9. Conscientiousness	3.19	0.56	3.30	0.65	3.28	0.64	0.18	0.85
10. Organization	3.14	0.93	3.18	1.01	3.18	1.00	0.04	0.87
11. Productiveness	3.23	0.70	3.31	0.71	3.29	0.71	0.11	0.68
12. Responsibility	3.19	0.47	3.41	0.60	3.38	0.59	0.39	0.50
13. Negative Emotionality	2.95	0.84	3.20	0.67	3.16	0.70	0.36	0.88
14. Anxiety	3.26	0.90	3.67	0.69	3.61	0.74	0.57	0.72
15. Depression	2.74	1.02	2.87	0.90	2.85	0.92	0.14	0.83
16. Emotional Volatility	2.83	1.01	3.05	0.83	3.02	0.86	0.26	0.80
17. Open-mindedness	3.93	0.66	3.88	0.56	3.88	0.57	-0.09	0.84
18. Intellectual Curiosity	4.14	0.70	4.04	0.62	4.06	0.63	-0.16	0.68
19. Aesthetic Sensitivity	3.69	1.05	3.85	0.86	3.82	0.89	0.18	0.86
20. Creative Imagination	3.96	0.63	3.74	0.63	3.77	0.63	-0.34	0.67
<hr/>								
Risk								
Risk ^a	5.92	2.28	5.38	2.36	5.46	2.36	-0.23	-
<hr/>								
Happiness								
Subjective Happiness Scale	4.52	1.36	4.75	1.17	4.72	1.2	0.20	0.86
Interdependent Happiness Scale	3.46	0.61	3.49	0.53	3.49	0.54	0.06	0.79
Self-Construal Scale	<hr/>							
Self-Expression	4.02	1.49	4.1	1.51	4.09	1.5	0.06	0.71
Self-Interest	4.43	1.4	3.71	1.15	3.82	1.21	-0.61	0.61
Behavioral Consistency	4.55	2.1	5.11	1.98	5.03	2.00	0.28	0.91
<hr/>								
Trust								
Trustworthiness	3.04	0.77	3.02	0.64	3.02	0.66	-0.03	0.76
<hr/>								
LOT								
Optimism	3.22	0.9	3.35	0.81	3.33	0.83	0.15	0.88
HEXACO Honesty-Humility	3.22	0.68	3.47	0.54	3.43	0.57	0.44	0.70
Sincerity	3.29	0.95	3.35	0.85	3.34	0.87	0.07	0.65

Fairness	3.05	1.08	3.36	0.9	3.31	0.93	0.32	0.66
Greed	2.84	1	3.07	0.87	3.04	0.89	0.26	0.59
Modesty	3.76	0.9	4.22	0.71	4.15	0.76	0.62	0.69
NARQ-S								
Admiration	2.73	0.84	2.43	0.61	2.47	0.66	-0.46	0.40
Rivalry	2.72	0.74	2.5	0.64	2.54	0.66	-0.32	0.52
Sample size	62		357		419			

Note. Gender d = Cohen's d for the mean-level difference between men and women, with

positive values indicating higher scores for women; absolute differences $\geq .25$ are significant at

$p < .05$. Combined values in the student sample are estimated for the full sample. ^aRisk is a

single-item measure, and therefore, α cannot be computed.

Table 7

Loadings of the BFI-2-XS Items in a RI-EFA with Bi-Geomin Rotation (Study 3)

Item, Domain, and item text		Extra- version	Agree- ableness	Conscien- tiousness	Negative Emotionality	Open- mindedness
<i>Extraversion</i>						
BFI16	Tends to be quiet	-0.70/-0.36	0.00/0.15	0.17/0.03	0.02/ 0.65	0.16/0.08
BFI21	Is dominant, acts as a leader	0.50/0.23	-0.40/-0.59	0.02/ 0.33	-0.01/-0.02	0.18/0.05
BFI41	Is full of energy	0.61/0.51	-0.01/0.15	0.09/0.27	0.30/-0.30	-0.01/0.04
<i>Agreeableness</i>						
BFI2	Is compassionate, has a soft heart	0.11/0.05	0.39/0.36	0.02/0.04	-0.12/-0.11	0.05/0.01
BFI7	Is respectful, treats others with respect	0.07/0.30	0.55/0.46	0.12/0.06	-0.01/0.03	0.04/0.09
BFI57	Assumes the best about people	0.23/ 0.34	0.47/0.34	-0.12/-0.07	0.14/0.01	0.00/-0.01
<i>Conscientiousness</i>						
BFI33	Keeps things neat and tidy	0.24/-0.02	-0.05/-0.05	0.50/0.54	-0.02/0.03	0.03/0.03
BFI53	Is persistent, works until the task is finished	0.24/-0.02	0.04/0.05	0.63/0.78	-0.03/-0.06	-0.02/-0.02
BFI13	Is dependable, steady	0.19/-0.01	0.00/-0.02	0.79/0.62	0.07/0.09	-0.03/-0.22
<i>Negative Emotionality</i>						
BFI4	Is relaxed, handles stress well	0.03/ 0.46	-0.10/-0.01	-0.02/-0.04	0.71/0.45	0.01/-0.02
BFI54	Tends to feel depressed, blue	-0.38/-0.64	-0.05/0.01	0.03/-0.03	-0.58/-0.08	0.20/0.16
BFI29	Is emotionally stable, not easily upset	0.11/ 0.59	0.02/0.00	0.09/-0.01	0.74/0.44	0.06/ -0.30
<i>Open-mindedness</i>						
BFI20	Is fascinated by art, music, or literature	0.02/-0.07	0.00/-0.04	-0.03/-0.01	0.09/0.03	0.65/0.61
BFI55	Has little interest in abstract ideas	-0.04/-0.18	-0.14/-0.03	0.00/-0.01	0.02/-0.04	-0.59/-0.72
BFI60	Is original, comes up with new ideas	0.51/0.36	-0.25/-0.08	-0.02/-0.05	-0.03/-0.18	0.31/0.31

Note. BFI-2 items copyright 2015 by Oliver P. John and Christopher J. Soto. Reprinted with permission. Loadings left of the forward slash are from the Study 3 calibration sample ($N = 209$). Loadings right of the forward slash are from the Study 3 validation sample ($N = 210$). Absolute loadings $\geq .30$ are bolded.

Table 8

Loadings of the BFI-2-s Items in a RI-EFA with Bi-Geomin Rotation (Study 3)

Item, Domain, Facet, and item text		Extra- version	Agree- ableness	Conscien- tiousness	Negative Emotionality	Open- mindedness
<i>Extraversion</i>						
<i>Sociability</i>						
BFI16	Tends to be quiet	-0.73/-0.74	0.08/-0.02	0.01/0.05	0.12/-0.02	-0.24/0.03
BFI1	Is outgoing, sociable	0.72/0.71	0.05/0.10	-0.02/0.01	-0.02/0.16	0.27/0.08
<i>Assertiveness</i>						
BFI21	Is dominant, acts as a leader	0.46/0.40	-0.38/-0.27	0.09/0.17	-0.08/0.12	0.00/-0.08
BFI36	Finds it hard to influence people	-0.41/-0.50	0.20/0.20	0.00/-0.07	0.04/-0.10	0.00/0.21
<i>Energy</i>						
BFI41	Is full of energy	0.63/0.40	0.02/-0.06	0.19/0.16	0.28/ 0.38	0.05/-0.07
BFI26	Is less active than other people	-0.49/-0.38	-0.02/0.22	-0.10/-0.16	-0.10/-0.30	0.05/0.25
<i>Agreeableness</i>						
<i>Compassion</i>						
BFI2	Is compassionate, has a soft heart	0.12/0.00	0.39/0.22	0.02/0.11	-0.11/0.00	-0.11/0.07
BFI17	Feels little sympathy for others	-0.08/-0.09	-0.55/-0.11	-0.04/0.04	0.08/-0.03	0.25/-0.08
<i>Respectfulness</i>						
BFI7	Is respectful, treats others with respect	0.07/-0.07	0.56/0.22	0.10/0.04	0.03/ 0.30	-0.01/-0.05
BFI37	Is sometimes rude to others	-0.10/0.17	-0.50/-0.31	-0.13/0.00	-0.11/ -0.37	0.10/-0.13
<i>Trust</i>						
BFI57	Assumes the best about people	0.32/0.00	0.54/0.56	-0.04/-0.04	0.23/ 0.37	0.03/-0.01
BFI42	Is suspicious of others' intentions	-0.24/0.03	-0.38/-0.59	-0.04/0.13	-0.28/ -0.43	-0.05/0.08
<i>Conscientiousness</i>						
<i>Organization</i>						
BFI33	Keeps things neat and tidy	0.14/0.08	0.05/-0.10	0.80/0.82	-0.03/0.07	0.01/0.01
BFI3	Tends to be disorganized	-0.06/-0.01	-0.06/0.02	-0.87/-0.82	-0.04/-0.19	-0.10/-0.05
<i>Productiveness</i>						
BFI53	Is persistent, works until the task is finished	0.11/0.06	0.00/-0.26	0.49/0.50	0.07/0.11	0.02/0.07
BFI23	Has difficulty getting started on tasks	-0.19/-0.11	0.08/0.30	-0.42/-0.39	0.02/-0.18	-0.05/0.11
<i>Responsibility</i>						
BFI13	Is dependable, steady	0.09/-0.01	0.04/ -0.42	0.58/0.42	0.18/0.14	0.08/0.22
BFI28	Can be somewhat careless	-0.07/0.01	-0.15/0.19	-0.65/-0.59	-0.01/-0.23	-0.11/0.00

<i>Negative Emotionality</i>						
<i>Anxiety</i>						
BFI4	Is relaxed, handles stress well	0.06/-0.17	0.00/0.10	-0.02/-0.03	0.65/0.55	-0.02/-0.02
BFI34	Worries a lot	-0.04/0.01	0.21/-0.11	0.26/0.28	-0.48/-0.39	-0.04/0.03
<i>Depression</i>						
BFI54	Tends to feel depressed	-0.40/-0.19	-0.07/0.00	-0.02/0.06	-0.54/-0.69	-0.17/-0.05
BFI9	Stays optimistic after experiencing a setback	0.46/0.10	0.06/0.13	-0.11/-0.10	0.54/0.61	-0.03/0.01
<i>Emotional Volatility</i>						
BFI29	Is emotionally stable, not easily upset	0.16/0.14	0.18/0.05	0.10/-0.18	0.78/0.70	-0.08/0.27
BFI14	Is moody, has up and down mood swings	-0.13/-0.06	-0.12/0.13	-0.07/0.00	-0.70/-0.70	0.05/-0.31
<i>Open-mindedness</i>						
<i>Intellectual curiosity</i>						
BFI55	Has little interest in abstract ideas	-0.13/0.04	-0.15/0.00	0.10/0.03	-0.01/-0.07	0.50/0.68
BFI10	Is curious about many different things	0.42/0.03	0.20/0.12	-0.10/-0.09	0.04/0.12	-0.39/-0.52
<i>Aesthetic Sensitivity</i>						
BFI20	Is fascinated by art, music, or literature	0.13/-0.07	0.09/0.05	-0.10/-0.06	0.04/-0.13	-0.73/-0.63
BFI5	Has few artistic interests	-0.11/0.02	-0.05/0.00	0.02/0.02	-0.02/0.05	0.82/0.74
<i>Imagination</i>						
BFI60	Is original, comes up with new ideas	0.50/0.41	-0.29/-0.05	0.00/-0.05	-0.08/0.21	-0.32/-0.47
BFI30	Has little creativity	-0.28/-0.19	0.11/0.13	0.09/-0.02	0.09/-0.06	0.60/0.62

Note. BFI-2 items copyright 2015 by Oliver P. John and Christopher J. Soto. Reprinted with permission. Loadings left of the forward slash are from the Study 3 calibration sample ($N = 209$). Loadings right of the forward slash are from the Study 3 validation sample ($N = 210$). Absolute loadings $\geq .30$ are bolded.

Table 9.

Summary and comparison of measurement properties for the BFI-2 and BFI-2-S facet scales (Study 3).

	Omega reliabilities									
	Part-whole correlations SP-BFI-2-S		Part-whole correlations SP-BFI-2-XS		SP-BFI-2		SP-BFI-2-S		SP-BFI-2-XS	
	Calib.	Valid.	Calib.	Valid.	Calib.	Valid.	Calib.	Valid.	Calib.	Valid.
<i>Extraversion</i>	0.91	0.87	0.88	0.87	0.87	0.85	0.87	0.85	0.60	0.55
Sociability	0.95	0.94			0.81	0.79	0.83	0.78		
Assertiveness	0.87	0.87			0.63	0.63	0.73	0.77		
Energy Level	0.89	0.87			0.77	0.79	0.74	0.70		
<i>Agreeableness</i>	0.94	0.91	0.82	0.75	0.84	0.80	0.82	0.77	0.51	0.48
Compassion	0.85	0.80			0.79	0.60	0.71	0.59		
Respectfulness	0.90	0.85			0.56	0.74	0.59	0.54		
Trust	0.89	0.88			0.74	0.68	0.83	0.70		
<i>Conscientiousness</i>	0.96	0.96	0.88	0.87	0.88	0.88	0.89	0.86	0.72	0.68
Organization	0.96	0.95			0.89	0.83	0.84	0.99		
Productiveness	0.91	0.92			0.71	0.74	0.71	0.71		
Responsibility	0.87	0.89			0.54	0.63	0.72	0.69		
<i>Negative Emotionality</i>	0.97	0.96	0.92	0.91	0.91	0.90	0.87	0.85	0.73	0.71
Anxiety	0.91	0.88			0.74	0.69	0.68	0.55		
Depression	0.94	0.94			0.84	0.83	0.73	0.73		
Emotional Volatility	0.93	0.93			0.82	0.82	0.81	0.79		
<i>Open-mindedness</i>	0.95	0.94	0.91	0.90	0.87	0.88	0.85	0.86	0.53	0.60
Intellectual Curiosity	0.87	0.83			0.66	0.63	0.59	0.63		
Aesthetic Sensitivity	0.94	0.94			0.85	0.85	0.83	0.79		
Creative Imagination	0.91	0.90			0.74	0.72	0.74	0.73		
Mean coefficient	0.92	0.90	0.88	0.86	0.77	0.76	0.77	0.74	0.62	0.60
Proportion of BFI-2 facet scale variance retained	0.85	0.81	0.77	0.74	-	-	0.99	0.97	0.71 ^a	0.72 ^a

Note. Calib. = Study 3 calibration sample (N = 209). Valid. = Study 3 validation sample (N = 210). All correlations are statistically significant at $p < 0.001$).

Proportion of BFI-2 facet scale variance retained equals the mean squared part-whole correlation, the ratio of the mean omega reliability for the SP-BFI-2-S and SP-BFI-2-XS compared to the full SP-BFI-2. ^aCompared only to the Big Five domains.

Table 10.

Nomological network of the Spanish BFI-2

Domain / Facet	Risk	SHS	IHS	Self-Expression	Self-Interest	Consistency	Trustworthiness	Optimism	Honest-Humi.	Sincerity	Fairness	Greed	Modesty	Admiration	Rivalry
Extraversion	.37	.48	.30	-.32	-.02	.36	.23	.39	-.00	-.05	.05	.02	-.05	.02	.33
Sociability	.27	.37	.20	-.30	-.04	.32	.15	.28	-.11	-.10	-.04	-.06	-.09	.08	.32
Assertiveness	.21	.24	.13	-.27	.15	.19	.02	.22	.02	.00	.03	.06	-.07	.01	.29
Energy Level	.38	.51	.36	-.19	-.05	.26	.26	.42	.08	-.03	.12	.08	.05	-.03	.18
Agreeableness	.01	.24	.27	.15	-.40	.08	.39	.27	.33	.16	.28	.19	.23	-.35	-.24
Compassion	-.01	.12	.21	.03	-.41	.07	.21	.10	.27	.11	.25	.12	.21	-.25	-.07
Respectfulness	-.11	.12	.15	.29	-.28	.03	.16	.09	.20	.10	.20	.07	.14	-.22	-.25
Trust	.13	.31	.26	.03	-.24	.08	.50	.41	.29	.15	.19	.24	.19	-.33	-.23
Conscientiousness	-.05	.08	.11	.03	-.03	.10	.04	.12	.17	.07	.23	.12	-.05	-.03	-.00
Organization	-.07	.01	.05	.01	-.06	.05	.01	.07	.10	.04	.15	.08	-.07	-.03	.01
Productiveness	.05	.15	.08	-.01	.10	.10	.09	.17	.18	.08	.23	.13	-.05	.02	.06
Responsibility	-.10	.08	.17	.09	-.12	.11	.01	.08	.18	.08	.23	.09	.00	-.07	-.09
Negative Emotionality	-.25	-.68	-.54	.08	-.11	-.19	-.26	-.60	-.03	.03	-.01	-.09	-.06	.12	.07
Anxiety	-.20	-.42	-.32	.05	-.12	-.08	-.22	-.39	.07	.07	.11	-.03	-.03	.07	.07
Depression	-.35	-.79	-.56	.23	-.11	-.24	-.23	-.71	-.01	.07	-.01	-.07	-.05	.08	-.08
Emotional Volatility	.37	.48	.30	-.32	-.02	.36	.23	.39	-.00	-.05	.05	.02	-.05	.02	.33
Open-mindedness	.27	.37	.20	-.30	-.04	.32	.15	.28	-.11	-.10	-.04	-.06	-.09	.08	.32
Intellectual Curiosity	.21	.24	.13	-.27	.15	.19	.02	.22	.02	.00	.03	.06	-.07	.01	.29
Aesthetic Sensitivity	.38	.51	.36	-.19	-.05	.26	.26	.42	.08	-.03	.12	.08	.05	-.03	.18
Creative Imagination	.01	.24	.27	.15	-.40	.08	.39	.27	.33	.16	.28	.19	.23	-.35	-.24

Note. N = 419; Absolute correlation values ≥ 0.10 are significant at $p < .05$. Convergent correlations are boldfaced. Discriminant correlations are

light-gray shadowed. Threshold was set at .30, which is an effect size that can be considered large (Gignac & Szodorai, 2016). Risk = Risk-

taking Behavior Item; SHS = Subjective Happiness Scale; IHS = Interdependent Happiness Scale; Self-Expression = Self-Construal Scale Self-

Expression vs. Harmony with others; Self-Interest = Self-Construal Scale Self-Interest vs. Commitment to others; Consistency = Self-Construal

Scale Behavioral Consistency; Trustworthiness = Trustworthiness Scale; Optimism = Life Orientation Scale Optimism; Honest-Humi. =

HEXACO-Honesty-Humility subscale; Admiration = Narcissism Admiration and Rivalry Questionnaire Admiration Subscale; Rivalry = Narcissism Admiration and Rivalry Questionnaire Rivalry Subscale.