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Translation and Initial Psychometric Evaluation of Spanish Versions of Three Psychedelic Acute Effects Measures: Mystical, Challenging, and Insight Experiences

Alan K. Davis PhD[a,b], Christopher Timmermann PhD[c], Ana Maria Ortiz Bernal BS[d], Rafaelle Lancelotta MS[a], Sandeep Nayak MD[b], Nathan D. Sepeda BS[a,b], Aki Nikolaidis PhD[f], and Roland R. Griffiths PhD[b,e]

[a]College of Social Work, The Ohio State University – Center for Psychedelic Drug Research and Education, Columbus, Ohio, USA; [b]Johns Hopkins University School of Medicine – Center for Psychedelic and Consciousness Research, Baltimore, Maryland, USA; [c]Centre for Psychedelic Reserach, Imperial College London; [d]Department of Human Development and Family Studies, University of Wisconsin-Madison – School of Human Ecology, Madison, Wisconsin, USA; [e]Johns Hopkins University – Department of Neuroscience; [f]Center for the Developing Brain, Child Mind Institute, New York, NY, USA

ABSTRACT

This study translated and tested the psychometric properties of acute psychedelic effects measures among Spanish-speaking people. The Psychological Insight Questionnaire (PIQ), Challenging Experiences Questionnaire (CEQ), and Mystical Experiences Questionnaire (MEQ) were translated before being incorporated into a web-based survey. We recruited native Spanish-speakers ($N = 442$; $M_{age} = 30.8$, SD = 10.9; Latino/Latina = 62%; Hispanic = 91.4%; male = 71.5%) to assess their previous experience with one of two psychedelics (LSD = 58.4%; Psilocybin = 41.6%) and their acute and enduring effects. Confirmatory factor analysis (confirming factor structure based on the English version) revealed a good fit for the MEQ, PIQ and the CEQ. Repeating our analysis in each drug subsample revealed consistency in factor structure for each assessment tool. Construct validity was supported by significant positive associations between the PIQ and MEQ, and between the PIQ and MEQ and changes in cognitive fusion and negative associations between changes in prosocial behaviors. As a signal of predictive validity, persisting effects (PEQ) were strongly related to scores on the MEQ and PIQ. Findings demonstrate that the Spanish versions of these measures can be reliably employed in studies of psychedelic use or administration in Spanish-speaking populations.

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Introduction

In recent years, there have been increasingly more studies on the acute and enduring psychological and behavioral effects of psychedelic drugs in humans. Clinical studies administering psilocybin, lysergic acid diethylamide (LSD), or ayahuasca in carefully monitored settings have shown preliminary safety and efficacy for such indications as Major Depressive Disorder (Carhart-Harris et al. 2021; Davis et al. 2021; Palhano-Fontes et al. 2019), nicotine use disorder (Johnson et al. 2014), and alcohol use disorder (Bogenschutz et al. 2015), as well as a variety of indications for psychological distress in the setting of cancer or life-threatening illnesses (Gasser, Kirchner, and Passie 2015; Griffiths et al. 2016; Ross et al. 2016), indicative that psychedelics may have transdiagnostic relevance (Kočárová, Horáček, and Carhart-Harris 2021). In addition, several dosing studies in healthy individuals have shown a range of impressive effects, including the induction of mystical, insight, and cathartic experiences with enduring positive sequelae (Griffiths et al. 2006, 2008, 2011; Uthaug et al. 2021).

In addition, online survey studies have investigated in cross-section or prospectively a wide variety of topics pertaining to psychedelic use. These include encounters with entities (Davis et al. 2020), God (Griffiths et al. 2016), metaphysical belief changes (Nayak and Griffiths 2022; Timmermann et al. 2021), and challenging psychedelic experiences (Carbonaro et al. 2016), among many others. However, both in-person dosing studies and online surveys have been plagued by a dearth of racial and linguistic diversity. As of 2018, 82% of participants in psychedelic studies were White (Michaels et al. 2018), with the majority of studies performed in

CONTACT Alan K. Davis davis.5996@osu.edu Center for Psychedelic Drug Research and Education, College of Social Work, 1947 College Road, The Ohio State University, Columbus, OH 43210, USA

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English-speaking participants. Such lack of representation is problematic in the development of any clinical treatment, as effects may differ across cultural groups and fail to generalize.

This potential diversity of outcomes based on cultural differences may be especially problematic in psychedelic research, as psychedelic effects are highly context dependent (Carhart-Harris et al. 2018; Gukasyan and Nayak 2020; Hartogsohn 2017; Nayak and Johnson 2020, Sepeda et al., 2019). For example, researchers in an earlier wave of psychedelic research remarked on the striking differences in the experiences of peyote on Native American and White participants: "The responses described in clinical experiments on Whites are so different from the responses described by Indigenous Peyotists [. . .] as to fall into completely different categories. They do not seem to be talking about the same thing" (Slotkin 1956). Thus, it is especially critical to expand psychedelic research beyond the confines of certain dominant cultural groups. However, there are several barriers to expanding research to lesser studied groups. For example, in dosing studies it is possible that the time and resource demands of very intensive studies skew toward more affluent populations. Yet, a great deal of psychedelic research takes the form of online surveys that could in principle reach anyone with internet access. However, this requires that commonly used measures be translated and validated into other languages. Indeed, even in-person dosing studies would require this.

Psychedelic studies, whether clinical studies or online surveys, increasingly draw from some assessments that have become standard in the field. These include mystical experiences (Mystical Experience Questionnaire; MEQ30), challenging experiences (Challenging Experiences Questionnaire; CEQ), psychologically insightful experiences (Psychological Insight Questionnaire; PIQ) and a range of enduring effects (Persisting Effects Questionnaire; PEQ), among others (Barrett et al. 2016; Barrett, Johnson, and Griffiths 2015; Davis et al. 2021; Griffiths et al. 2006, 2011, 2016; Nour et al. 2016). However, there have been scant efforts to translate these questionnaires into other languages. The MEQ30 has been translated into Brazilian Portuguese, French, and Finnish (Fauvel et al. 2022; Kangaslampi, Hausen, and Rauteenmaa 2020; Schenberg et al. 2017). The CEQ has been translated into German (Dworatzyk et al. 2022). Yet to our knowledge, no commonly used psychedelic scales have been translated into and validated in Spanish.

There are several reasons to expand psychedelic assessment tools into the Spanish language. First, Spanish is among the most spoken languages in the world (Eberhard, Simons, and Fenning 2019). Second, several Central and South American Spanish-speaking countries are home to various indigenous traditions of classic psychedelic use dating hundreds, and in some cases, possibly thousands of years (Glass-Coffin 2010; Guerra-Doce 2015). Third, in the United States (U.S.), Spanish is the second most spoken language after English (American FactFinder 2020). Thus, it is important to expand clinical investigations to Spanish-speaking populations. Given the growing proportion of Spanish-speaking individuals in the U.S (Ennis, Rios-Vargas, and Albert 2011). and the need to ensure access to these psychedelic studies, it is critical that the assessment tools developed in English-speaking populations be translated and validated to increase inclusion in psychedelic research. Therefore, the present study tested the psychometric properties of the Spanish translation of measures in psychedelic research to remove barriers to conducting research with more diverse populations. This study represents an important step in characterizing the phenomenology of psychedelic experiences among Spanish-speaking individuals, and study findings could provide reliable and valid measures of such experiences to be used in future research in these populations.

Method

Measure translation

We first translated all measures using the forward- and back-translation technique. Translations were performed by team members fluent in English and native Spanish speakers. The survey was first created in English then translated into Spanish by CT. This Spanish version was then translated back into English by AMOB. RL then compared this "back-translation" to the original English questionnaires to ensure the translation process had not altered the meaning of the questionnaires. In the event of discrepancies or confusion, individual phrases were retranslated to ensure appropriate clarity and meaning. The following measures were translated: Mystical Experience Questionnaire (MEQ), Challenging Experiences Questionnaire (CEQ), Psychological Insight Questionnaire (PIQ), Persisting Effects Questionnaire (PEQ), Ego Dissolution Inventory (EDI), Nature Relatedness scale, Cognitive Fusion Questionnaire and Prosocial Behavioral Intentions Scale. All measures are available in the supplementary materials (Tables S1 - S8).

Procedure

Respondents were invited to complete an anonymous online survey of Spanish speakers who had a memorable psychedelic experience. Participants were recruited via a variety of methods including posts on Spanish language Facebook groups, e-mails to prominent psychedelic organizations, social media advertisements, the study website, and word of mouth. Interested individuals were referred to our survey website (www.qualtrics.com), where they were presented with our study flyer and informed consent document describing inclusion criteria (i.e., being at least 18 years old, able to read, write, and speak Spanish fluently, having taken a dose of mescaline/Peyote/San Pedro, psilocybin/psilocybin mushrooms, LSD, or 5-MeO-DMT). We chose to focus on 4 psychedelic substances either because they are widely used (psilocybin/psilocybin mushrooms and LSD) or because of their use specifically among Spanish-speaking communities where they are grown/found (mescaline/Peyote/San Pedro and 5-MeO-DMT). After completing consent, respondents completed survey questionnaires. The study was approved by the Johns Hopkins University School of Medicine Institutional Review Board. No incentives were offered.

Participants

Recruitment occurred from June 2020 to June 2021. A total of 6,283 people clicked the survey link, and 2,458 consented and started taking the survey. Analyses for the current report were restricted to psilocybin and LSD sub-samples to explore the psychometric properties of the questionnaires for the two most prevalent psychedelics used (Krebs, Johansen, and Lu 2013), thus 541 responses were excluded from the current analysis. Of the remaining 1,917 respondents, 458 completed the survey (184 and 258 in the psilocybin and LSD groups, respectively). Of these, 16 more were excluded (4: indicated their responses were inaccurate, 2: duplicate IP addresses, and 10: younger than 18). Therefore, the final sample was comprised of 442 respondents (184 and 258 in the psilocybin and LSD groups, respectively).

Measures

Demographic data included: age, gender, race, ethnicity, Hispanic identification, sexual orientation, country of residence, employment status, education level and relationship status. Psychedelic use information included: form of drug, number of times consumed before the reference experience, relative strength of the dose.

The Mystical Experience Questionnaire (MEQ-30) is a 30-item self-report measure that assesses subjective mystical experiences, yielding a total score and four subscale scores: mystical, positive mood, transcendence of time and space, and ineffability (Barrett, Johnson, and Griffiths 2015). Questions on this scale are recorded on a 6-point Likert-type scale ranging from "none; not at all" to "extreme."

The Challenging Experiences Questionnaire (CEQ) uses 26-items to assess psychologically and physically challenging experiences related to the psychedelic experience. It comprises 7 subscales: grief, fear, insanity, death, isolation, physical distress, or paranoia (Barrett et al. 2016). Questions on this scale are recorded on a 6-point Likert-type scale ranging from "none; not at all" to "extreme."

The Psychological Insight Questionnaire (PIQ) assesses psychological insights that have occurred during the psychedelic experience related to emotions, beliefs, memories, and relationships (Davis et al. 2021). The final validated scale in English comprises 23-items with two subscales (goals and adaptive patterns insights, and avoidance and maladaptive patterns insights). Questions of this scale are recorded on a 6-point Likert-type scale ranging from "none; not at all" to "extreme."

We included fifteen items from the Persisting Effects Questionnaire (PEQ). Four items asked respondents to rate the extent to which their psychedelic experience was personally meaningful, spiritually significant, psychologically insightful, and psychological challenging. These are rated on an 8-point scale ranging from "No more than routine, everyday experiences" to "The single most meaningful experience of my life." The remaining items probed the degree to which each respondent believed their psychedelic experience had led to persisting changes in their personal well-being or life satisfaction, life's purpose, life's meaning, social relationships, attitudes about life, attitudes about self and relationship to nature. These are rated on a 7-point scale ranging from "Strong positive change that I consider desirable" to "Strong negative change that I consider undesirable."

The 8-item Ego Dissolution Inventory (EDI) was included to assess the degree to which the respondent lost the capacity for self-referential processing during the psychedelic experience, thus giving way to feelings of unity and connectedness. Questions of this scale are recorded on a 6-point Likert-type scale ranging from "none; not at all" to "extreme."

The Nature Relatedness Scale (NR-6) is a 6-item scale that was included to capture respondent's perceived connectedness with the natural world (Nisbet & Zelenski, 2013). Two iterations of this measure were completed by respondents: one with respect to their

answers before their psychedelic experience, and one capturing their answers after their psychedelic experience. Questions of this scale are recorded on a 5-point scale ranging from "Disagree strongly" to "Agree strongly."

The Cognitive Fusion Questionnaire (CFQ) is a 7-item questionnaire that was included to measure the construct of cognitive fusion as operationalized within the framework of Acceptance and Commitment Therapy; a form of cognitive behavioral therapy that emphasizes distancing (defusing) from thoughts as a key ingredient in therapy (Harris 2006). Two iterations of this measure were completed by respondents: one with respect to their answers before their psychedelic experience, and one capturing their answers after their psychedelic experience. Questions of this scale are recorded on a 7-point scale ranging from "never true" to "always true."

The Prosocial Behavioral Intentions Scale (PBIS) is a 4-item scale that was included to measure pro-social behavioral intentions (Baumsteiger and Siegel 2019). Two iterations of this measure were completed by respondents: one with respect to their answers before their psychedelic experience, and one capturing their answers after their psychedelic experience. Questions of this scale are recorded on a 7-point scale ranging from "Definitely would not do this" to "Definitely would do this."

Analysis

Demographic data were compared between the psilocybin and LSD groups using Welch's *t*-test and chi-square independence tests. Analyses focused on examining the psychometric structure of three domains characterizing the psychedelic experience: MEQ, PIQ, and CEQ. We aimed to assess the Spanish version of these tests to validate whether their factor structure paralleled the previously published English version. After psychometric assessment, we also investigated the relationship of these three domains to a range of demographic characteristics and outcome variables including sex, race, age, prosocial behavior, nature relatedness, and cognitive fusion. Change scores were calculated for the measures of prosocial behavior, nature relatedness, and cognitive fusion, subtracting the after the psychedelic experience ratings from the before the psychedelic experience ratings. These change scores were used in all analyses.

We conducted a confirmatory factor analysis (CFA) to assess the psychometric structure of each of the tests in Spanish using factor structures hypothesized from the English version of these scales. We used the established factor structure for the English version tests to setup each factor structure as follows. Based on their current psychometric properties in the English versions, the CEQ was separated into seven factors (isolation, grief, fear, physical discomfort, insanity, paranoia, and death); the PIQ was separated into two factors (avoidance and maladaptive patterns, goals and adaptive patterns); the MEQ was separated into four factors (transcendence, positive mood, ineffability, mystical). We assessed the overall quality of the factor structure for these domains. Given our large sample in our study, we used comparative fit index (CFI) as our primary metric of CFA fit because it is not biased by the size of the sample used in the factor analysis (Bentler 1990). Our main results describe the psychometric structure of these tests from the sample, but we also repeated these analyses for subsamples of our data where participants affirmed having an experience with either psilocybin or LSD (available in Supplemental Materials, S. Tables 9–12).

Results

Respondent characteristics

Sample demographics are provided in Table 1. The total sample was comprised of 442 respondents, of which 184 reported using psilocybin and 258 reported using LSD. The majority of respondents were heterosexual (80.3%) and male (71.5%). The two groups differed in age ($p < .001$), educational attainment ($p=.034$), employment status ($p=.017$), relationship status ($p=.003$), and ethnicity ($p=.005$). The two groups did not statistically differ in gender, sexual orientation, or race. The results also did not reveal differences in subjective dose strength between groups; however, the psilocybin group reported fewer experiences ($M = 5.9$, $SD = 6.9$) since their reported experience compared to the LSD group ($M = 4.6$, $SD = 5.7$), $t(429.26) = 2.174$, $p = .03$. Country of residence is reported in Supplemental Table 13. As Table S-13 shows, most participants lived in Mexico (34.2%), Columbia (12.4%), the United States (12.0%), Argentina (10.9%), and Spain (7.0%).

Factor analysis

Running CFA on the PIQ, MEQ, and CEQ showed an acceptable to-good fit (All CFI 0.84–0.90; Table 2), and individual factor reliabilities were adequate-to-excellent for each subscale of these measures (see Table 3). To test the robustness of our factor structure on each assessment of psychedelic experiences across multiple substances we repeated our analysis in independent subsamples that either had psilocybin or LSD.

Table 1. Sample demographics and comparison between drug groups. Age and number of psychedelic uses are reported as means (standard deviations) and using Welch's t tests to compare groups. Gender, sexual orientation, education, employment, relationship status, race, ethnicity, and subjective dose strength are reported as percentages, using χ2 tests to compare groups.

	All ($n = 442$)	Psilocybin ($n = 184$)	LSD ($n = 258$)	$t/\chi 2$	df	p	Cohen's d/Cramer's V
Age	30.8 (10.9)	34.6 (11.6)	28.1 (9.5)	6.298	343.66	**< .001**	0.618
Gender				4.452	3	0.217	0.100
Male	71.5%	66.8%	74.8%				
Female	26.9%	31.0%	24.0%				
Transgender	0.2%	0.5%	0.0%				
Gender-fluid	1.4%	1.6%	1.2%				
Sexual Orientation				5.059	3	0.168	0.107
Heterosexual	80.3%	78.8%	81.4%				
Homosexual	5.0%	7.6%	3.1%				
Bisexual	13.1%	12.5%	13.6%				
Asexual	1.6%	1.1%	1.9%				
Education				13.638	6	**0.034**	0.176
Less than high school	1.6%	2.2%	1.2%				
Graduated high school	10.6%	6.5%	13.6%				
Trade/technical school	7.2%	7.6%	7.0%				
Some college, no degree	35.1%	34.2%	35.7%				
Associate's degree	5.4%	3.8%	6.6%				
Bachelor's degree	24.9%	25.0%	24.8%				
Advanced degree (Master's, Ph.D., M.D.)	15.2%	20.7%	11.2%				
Employment				18.607	8	**0.017**	0.205
Employed full-time	29.6%	33.2%	27.1%				
Employed part-time	6.3%	5.4%	7.0%				
Self-employed	20.6%	27.2%	15.9%				
Student (not otherwise employed)	19.2%	14.1%	22.9%				
Student (and employed)	14.5%	11.4%	16.7%				
Unemployed	5.7%	4.3%	6.6%				
Retired	0.2%	0.0%	0.4%				
On disability	0.5%	0.0%	0.8%				
Other	3.4%	4.3%	2.7%				
Relationship				8.760	1	**0.003**	0.141
Married/Partnered/Relationship	57.7%	49.5%	63.6%				
Single/Divorced/Separated/Widowed	42.3%	50.5%	36.4%				
Race				4.786	5	0.443	0.104
White/Caucasian	21.7%	26.1%	18.6%				
Black/African	0.0%	0.0%	0.0%				
Asian/Pacific Islander	0.0%	0.0%	0.0%				
Native Americans of the United States	0.2%	0.0%	0.4%				
Alaskan Natives	0.0%	0.0%	0.0%				
Latino/Latina	62.0%	59.2%	64.0%				
Mixed	10.6%	9.2%	11.6%				
Indigenous from Latin America	1.8%	2.2%	1.6%				
Other	3.6%	3.3%	3.9%				
Hispanic				7.930	1	**0.005**	0.134
No	8.6%	13.0%	5.4%				
Yes	91.4%	87.0%	94.6%				
Subjective dose strength							
Low	-	9.2%	4.7%	6.669	4	0.154	0.123
Moderate	-	31.5%	27.5%				
Moderately high	-	28.8%	35.7%				
High	-	19.6%	23.3%				
Very high	-	10.9%	8.9%				
No. times used psilocybin/LSD							
Before reported experience	-	4.1 (5.9)	4.6 (6.3)	0.724	409.2	0.470	0.069
Since reported experience	-	4.6 (5.7)	5.9 (6.9)	2.174	429.26	**0.030**	0.139
Past five years	-	2.5 (1.3)	2.8 (1.2)	1.798	378.18	0.073	0.207
Lifetime	-	8.9 (7.0)	9.9 (7.1)	1.430	389.5	0.154	0.174

We found that the factor analysis patterns for each subsample replicated those that we saw in the full sample, demonstrating consistency in factor structure of each assessment across these two psychedelic substances (Table 2). Notably, we found moderate to good fit for all factors in both the LSD and psilocybin subsamples, with all domains showing a good fit (All CFI 0.83–0.90). This suggests that the Spanish translations of the questionnaires can be applied across multiple psychedelic substances robustly.

Factor associations with outcomes

We found evidence for individual differences in outcome measures to be associated with our psychedelic experience domains. Moderate significant positive

Table 2. CFA Fit summaries for across the full sample and LSD and psilocybin subsamples. CFI: Comparative Fit Index; TLI: Tucker Lewis Index; AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion; RMSEA: Root mean squared error of approximation. Original MEQ with poor model fit is included as well as refit MEQ for full sample as well as LSD and Psilocybin subsamples.

	Chi Sq	CFI	TLI	AIC	BIC	RMSEA
Full Sample CEQ	1212.7	0.90	0.88	34015.3	34314.0	0.09
Full Sample PIQ	1074.6	0.90	0.89	32808.1	33000.3	0.09
Full Sample MEQ	1586.1	0.84	0.82	42262.1	42532.1	0.08
LSD CEQ	899.2	0.88	0.86	20532.9	20792.3	0.09
LSD PIQ	837.3	0.87	0.86	19215.5	19382.5	0.1
LSD MEQ	1086.1	0.83	0.81	25139.0	25373.5	0.08
Psilocybin CEQ	775.8	0.88	0.86	13220.7	13455.4	0.1
Psilocybin PIQ	659.4	0.88	0.87	13520.9	13672.0	0.1
Psilocybin MEQ	997.6	0.84	0.82	16971.1	17183.3	0.1

Table 3. Each of the individual factor reliabilities for the MEQ, PIQ, and CEQ are provided. Coefficient alpha, as well as three types of coefficient omega, each modeling uncorrelated measurement errors, correlated measurement errors, and observed covariance matrix for omega, omega2, and omega3 respectively. Average variance extracted for each factor is also provided.

	alpha	omega	omega2	omega3	avevar
CEQ Isolation	0.86	0.86	0.86	0.87	0.68
CEQ Grief	0.86	0.85	0.85	0.80	0.49
CEQ Fear	0.94	0.94	0.94	0.94	0.75
CEQ Physdist	0.82	0.82	0.82	0.82	0.48
CEQ Insanity	0.80	0.81	0.81	0.82	0.60
CEQ Paranoia	0.75	0.75	0.75	0.75	0.60
CEQ Death	0.89	0.89	0.89	0.89	0.80
PIQ AMP	0.96	0.96	0.96	0.96	0.62
PIQ GAP	0.92	0.92	0.92	0.92	0.58
MEQ Transcendence	0.73	0.74	0.74	0.74	0.42
MEQ Positive	0.72	0.72	0.72	0.73	0.40
MEQ Ineffability	0.63	0.65	0.65	0.66	0.39
MEQ Mystical	0.88	0.88	0.88	0.87	0.48

Table 4. All significant associations ($p < .05$) between the CEQ, MEQ, and PIQ domains are shown here CEQ_1: Isolation; CEQ_2: Grief; CEQ_3: Fear; CEQ_4: Physical discomfort; CEQ_5: Insanity; CEQ_6: Paranoia; CEQ_7: Death; PIQ_1: Avoidance and Maladaptive Patterns Insights (AMP); PIQ_2: Goals and Adaptive Patterns Insights (GAP); MEQ_1: Transcendence; MEQ_2: Positive; MEQ_3: Ineffability; MEQ_4: Mystical. All correlations $-0.2 \leq r \leq 0.2$ are removed. All colored panels represent significant correlations, ranging from red to green (Pearson's $r = -1,1$).

	CEQ							**PIQ**		**MEQ**			
	Isolation	Grief	Fear	Phys Disc	Insanity	Paranoia	Death	AMP	GMP	Transcend.	Positive	Ineffability	Mystical
Cog. Fus.								-0.38	-0.38		-0.29		-0.28
Nat. Rel.								0.21	0.22	0.21	0.23	0.23	0.27
Pro. Soc.								0.25	0.27	0.26	0.24	0.21	0.25
PEQ_1							0.21	0.30	0.40	0.34	0.37	0.30	0.46
PEQ_2							0.22	0.38	0.48	0.38	0.50	0.34	0.57
PEQ_3	0.29	0.36	0.37	0.33	0.38	0.35	0.36	0.38	0.37	0.35	0.27		0.36
PEQ_4							0.20	0.47	0.53	0.31	0.41	0.31	0.49
PEQ_5								0.30	0.35		0.21		0.23
PEQ_6								0.36	0.44		0.26		0.29
PEQ_7								0.38	0.47		0.29		0.33
PEQ_8								0.36	0.41		0.25		0.24
PEQ_9								0.34	0.43		0.32	0.22	0.29
PEQ_10								0.38	0.47		0.30		0.32
PEQ_11								0.32	0.40		0.35		0.33
PEQ_12								0.38	0.48		0.32		0.34
PEQ_13								0.37	0.46	0.22	0.37	0.25	0.43
PEQ_14							0.23	0.32	0.39	0.27	0.33		0.39
PEQ_15								0.31	0.42	0.21	0.35	0.22	0.41

correlations were observed between the PIQ and MEQ scales and the pre-post changes observed in Cognitive Fusion (positive values in this change score indicate a decrease in the negative thought patterns measured by Cognitive Fusion; Table 4), suggesting that individuals who experienced stronger psychological insight and mystical experiences after ingesting psychedelic substances experienced improvements in this domain (Table 4). Changes in prosocial behaviors were significantly negatively associated with PIQ and MEQ factors, suggesting that having greater mystical and psychological insight experiences were related to increases in prosocial behavior after the psychedelic experience (negative values in this change score is an increase in behaviors described in the Prosocial Behaviors Scale; Table 4). Moderate significant positive correlations were also observed between the PIQ and MEQ and the pre-post changes observed in Nature Relatedness (positive values in this change score indicate an increase in connection with nature as measured by the Nature Relatedness Scale; Table 4). Persisting effects were also more strongly related to MEQ and PIQ scales, with every PEQ item demonstrating significant positive correlations with MEQ and PIQ scales. Notably, questions 3 ("How psychologically challenging was your experience and your contemplation of that experience?") and 4 ("How psychologically insightful was your experience and your contemplation of that experience?") were positively associated with most CEQ factors as well. Overall, these results show that MEQ and PIQ are associated with the PEQ, Cognitive Fusion, and Nature Relatedness scales, and that the CEQ was less strongly associated with these measures (Table 4). We repeated these analyses for the LSD and psilocybin subsamples and found high consistency in the factor score associations with our outcome variables (Supplemental Tables 11–12).

Discussion

In the present study we performed a survey investigation to test the psychometric properties of the Spanish versions of widely used English assessments of acute psychedelic experiences and their relationship to several outcomes. Overall, the findings revealed that measures of mystical-type experiences (i.e., MEQ), psychological insight (i.e., PIQ), and challenging experiences (i.e., CEQ) showed reliable psychometric structure after being translated into Spanish. These findings indicate that these assessments of acute psychedelic experiences can be applied to Spanish-speaking individuals in laboratory and survey-based research settings, suggesting their applicability to a wider variety of cultural backgrounds.

From a historical perspective, the use of psychedelics has been strongly linked to Indigenous and mixed-race populations in Latin America (Samorini 2019), in which the Spanish language is commonly used. This is contrasted with contemporary research involving the use of psychedelics which has mostly focused on English-speaking individuals. Although there are reasons for the focus on English-speaking populations (e.g., privileged position of English-speaking institutions both funding and conducting psychedelic research), the lack of validated research instruments in other languages is a major barrier to expanding the scope of research in this field. The present survey findings provide a step forward in advancing research in more culturally diverse populations, including those linked to the traditional use of psychedelics, involving substances such as psilocybin mushrooms, Ayahuasca, and the mescaline-containing cacti Peyote and San Pedro. Advancing in this direction may represent an important step toward assessing 1) the suitability of using psychometric questionnaires for individuals with a wider range of cultural provenance and 2) the tools which may be used to establish commonalities and differences pertaining the subjective effects of substances that the evidence suggests are highly influenced by contextual and cultural influences (Carhart-Harris et al. 2018).

The importance of validating tools such as the MEQ, PIQ, and CEQ are relevant to both characterize the phenomenology of psychedelic experiences and also to better determine psychological mechanisms which may underlie the therapeutic efficacy for psychedelics in mood, anxiety and substance use disorders, among others (Davis, Barrett, and Griffiths 2020; Yaden and Griffiths 2021). For example, the degree to which participants experience mystical-type experiences has been found to predict reductions of scores in measures of depression (Roseman, Nutt, and Carhart-Harris 2018), end-of-life anxiety (Griffiths et al. 2016), and addictive behaviors (Garcia-Romeu, Griffiths, and Johnson 2015), as well as increases in scores of well-being (Haijen et al. 2018) weeks after the acute psychedelic effects have subsided. The relevance of validating the MEQ for Spanish-speaking populations is thus relevant to properly determine the target states by psychedelic therapy in Spanish-speaking individuals.

Indeed, our results found that scores on the MEQ and the PIQ correlated significantly with self-report outcomes such as improvement in cognitive fusion

and increases in prosocial behaviors. Cognitive fusion (the inability to detach from certain thoughts; Hayes 2019) has been proposed to be a key component of psychological inflexibility, which in turn may be central for a range of mental health conditions of transdiagnostic relevance (Levin et al. 2014). Findings of correlations between the Spanish versions of the MEQ/PIQ and changes in cognitive fusion, are thus consistent with the notion that psychedelics may act on core psychological mechanisms associated to a wide variety of mental health conditions (Kočárová, Horáček, and Carhart-Harris 2021), thereby providing evidence of the potential applicability of psychedelic therapy to more diverse populations.

Similarly, the association between Spanish versions of the MEQ/PIQ scores and changes in prosocial behaviors highlight previous evidence of acute increased empathy, sociality, and feelings of shared humanity induced by psychedelics, which have been found in both controlled and naturalistic environments (Dolder et al. 2016; Kettner et al. 2021). The relationship between psychedelics and intersubjectivity, as well as relational dimensions of wellbeing are resonant with the ritual use of psychedelics by Indigenous and mestizo populations. In these ritual contexts, it has been proposed that psychedelics serve a fundamental function of social cohesion (Kettner et al. 2021). We found that increased prosocial behaviors were linked to the extent to which individuals experienced acute mystical-type and psychological insight experiences in Spanish-speaking individuals, which may bear relevance for determining resonances between contemporary and traditional uses of psychedelics by populations living within the same region (i.e., Latin America). Furthermore, the replication of previous findings concerning increases in nature connectedness (determined here using the nature relatedness questionnaire) and persisting effects of meaningfulness of the psychedelic session also replicate previous findings in English-speaking participants (Griffiths et al. 2008; Kettner et al. 2019).

Taken together, the findings from this study point toward commonalities of psychedelic experiences between previously published findings among English-speaking participants and the sample of Spanish-speaking respondents we present here. Importantly, all measures showed good factor structure, and it is possible that there are cultural similarities that may have a significant influence in both the verbalization and actual lived qualities of psychedelic experiences which have commonly been deemed as mystical, insightful, and challenging. Nevertheless, it is important to note some limitations to the present findings. Consistent with the design of this survey study, the sample was self-selected and all measures relied on self-report. Furthermore, most of the sample consisted of male respondents and further studies may be needed to establish if the validity of these measures may hold in a gender-balanced sample. Also, despite the use of a retrospective pre-post survey design to better understand the self-reported changes in functioning before and after a memorable psychedelic experience, this methodology limits the ability to make any causal inferences regarding the impact of acute psychedelic experiences and changes in nature relatedness, cognitive flexibility, and prosocial behaviors. Further research using prospectively collected data are needed to provide such claims and are a worthy next step in this line of inquiry. Additionally, there was a large sample in this study, and so CFI was used as a primary CFA fit metric because it is not biased by sample size (Bentler 1990). Our results showed we were at or just below the cutoffs for acceptable fit based on CFI. However, we believe that retaining the factor structure of the MEQ, CEQ, and PIQ, has a number of theoretical and practical advantages (e.g., comparing scores to English versions of these questionnaires, allowing for future research to explore the factor structure of these newly devised questionnaires in laboratory and clinical settings, aligning the theoretical underpinnings of these constructs across linguistic boundaries and populations), that outweigh the desire for seeking a "best" fitting model through removing items from the scale or searching for a new model structure. However, this is a limitation that should be explored further as the Spanish-version of these scales are used in other studies.

The objective of the present study was to validate Spanish translations in commonly used measures of psychedelic experiences, as well as determine their relationship with outcome variables in order to address some of the limitations of diversity of participants in psychedelic studies. Our findings showed that these measures can be reliably employed in future studies of psychedelic substances in Spanish-speaking populations and suggests that some of the central psychological mechanisms previously associated with the potentially favorable outcomes linked to psychedelic use may also apply in these individuals.

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