Trends
in Psychiatry and Psychotherapy

JOURNAL ARTICLE PRE-PROOF
(as accepted)

Original Article

PID-5-SRF online administration: psychometric indicators and measurement invariance between different formats of data collection

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PID-5-SRF online administration: psychometric indicators and measurement invariance between different formats of data collection

Short title: PID-5: online brazilian version

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Abstract

Introduction: The PID-5 is a tool used to assess maladaptive personality traits according to the DSM-5 Alternative Model. Objective: The objective is to seek evidence of the validity and reliability of the Personality Inventory for DMS-5 (PID-5-SRF) administered online and assess its measurement invariance compared to the paper-and-pencil administration. **Method:** A sample of 274 individuals from the general population (73.4% of women; 34.76 years old ±11.6) completed the instrument online after the study was disseminated on social media and among the authors' contacts. **Results**: Internal consistency (facets α≥0.70; domains α≥0.89) and test-retest reliability (15 to 30 days: facets ICC≥0.63; domains ICC≥0.82) were satisfactory, but a floor effect was found in almost all the items. A large number of facets (N=9) showed better fit to a bifactorial structure, and the Exploratory Factor Analysis suggested that a six-factor model better fits the data. Measurement invariance between the online and paper-and-pencil administrations was not attested at a configural level. **Conclusion:** The results revealed satisfactory psychometric indicators when the instrument was applied online, confirming its feasibility in collecting data. However, the instrument's structure is

not invariant, and caution must be adopted when comparing and interpreting data collected through different formats.

PID-5-SRF ＊, online ＊, administration ＊, psychometric ＊, indicators ＊, measure-ments.

INTRODUCTION

The internet is a tool increasingly used in scientific research.[1] Some researchers note the benefits of collecting data online, suggesting that this format will become even more disseminated and eventually replace the traditional paper-and-pencil format[2]. Collecting data online is less expensive, faster, and more accurate, and larger populations can be accessed while the confidentiality of the participants' identities can be ensured.[3]

The psychometric properties of instruments used to collect data online must be tested, regardless of the results obtained in paper-and-pencil administrations.[3] Many researchers argue that the measurement of an instrument does not vary when administered in different formats;[4] however, there is no consensus around this notion.[5] Studies show that web-based surveys present some specificities. These specificities concern low bias associated with social desirability or,[6] on the contrary, high sampling bias due to barriers to accessibility, especially in less developed countries with more restricted digital access or with older, or less educated populations.[7,8] Such biases may change how an instrument is completed impacting its configurations and parameters.[9,10]

With the publication of the DSM-5, a new self-report instrument, the "Personality Inventory for DSM-5" (PID-5-SRF), was proposed to support a dimensional assessment of maladaptive traits. It was written in English and is composed of 220 items rated on a 4-point Likert scale.[11] It has been the subject of several studies since its publication, involving the analysis of its psychometric qualities and cross-cultural adaptation to other languages.[12,13] Furthermore, some of these studies applied it online, such as Bo et al.,[14] Suzuki et al.,[15] and Zimmerman et al.,[16] and reported appropriate psychometric indicators comparable to the paper-pencil administration.[17,18,19] However, thus far,

measurement invariance according to different delivery formats has not yet been verified.

We recently conducted the cultural adaptation of the PID-5-SRF to the Brazilian context, and the psychometric study of the paper-pencil version presented satisfactory psychometric indicators.[20] Hence, given the current context marked by the advent of online technologies, the objective is to assess the validity and reliability of the Brazilian version of the PID-5-SRF when applied online and investigate whether there is measurement invariance between the paper-pencil and web-based administrations.

METHOD

The Institutional Review Board (Process No. 4058/2018) approved the study, and the participants provided their consent through a free and informed consent form accessed in the data collection platform.

Participants

The study was disseminated in social media, to the researchers' contacts, and through institutional e-mails. Data were collected online between July 2019 and January 2020 via Google Forms. After accessing the link, the participants were asked to give their consent through a free and informed consent form to complete the instrument. Eligible individuals were 18 years old or older, both sexes, literate, and with good comprehension skills.

The initial sample comprised 327 individuals, 53 of whom were excluded due to missing data, as they did not submit their responses. Hence, the final sample comprised 274 participants. Fifteen days later, the participants received a link via email for the retest, and 73 participants completed the instrument in this stage.

The sample of a previous study in which PID-5-SRF was applied in the paper-pencil format was used to test the measurement invariance.[20] Of the 2000 eligible individuals, 832 did not return the questionnaires; 58 did not answer the form correctly, 380 missed data and 730 were included in the final sample. The inclusion and exclusion criteria of both studies are identical.

Instruments

The data collection protocol comprised the following instruments:

a. Personality Inventory for the DSM-5 (PID-5-SRF): developed by Krueger et al.[11] and culturally adapted to Brazil by Barchi-Ferreira et al.;[13]

b. The Response Inconsistency Scale: developed by Keeley et al.,[21] whose validity and clinical usefulness was verified by Sellbom et al.,[22] to detect potentially invalidating response style;

c. Sociodemographic and clinical questionnaire: 19-item form specifically developed for this study.

Data analysis

PID-5-SRF data were coded according to its technical guidelines. The analyses were performed using IBM SPSS and Mplus, with the significant level established at $p \leq 0.05$. Descriptive statistics (mean, standard deviation, frequency, and percentage) and group comparison tests (t student and Chi-square) were used to characterize and analyze the sample. Cronbach's alpha was used to verify internal consistency, which is adequate when above 0.70.[23] The Intraclass Correlation Coefficient (ICC) was used for the test-retest reliability with a 95% confidence interval.

The polychoric correlation matrix and unweighted least squares extraction (ULS – a method that does not require normal distributions) were used to verify the facets' unidimensionality.[24,25] Parallel analysis,[26] Velicer's minimum average partial (MAP),[27] and the Hull method were used to assess the most appropriate number of factors.[28] The adequacy of the one-factor solution was verified through the following indexes: Chi-Square (X^2), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Root Mean Square Residual (RMSR), adopting the following parameters: X^2/df equal to or below 3,[29,30] TLI values close to 1.00 or higher than 0.90, and RMSR close to or below 0.08,[31] RMSEA close to or below 0.08.[29]

The study of Exploratory Factor Analysis (EFA) was conducted at the facet level considering a Pearson correlation matrix. The ULS method was used for extraction[24,25] with Promax rotation.

The invalidating response style was assessed using the Response Inconsistency Scale, following the criteria proposed by Keeley et al.,[21] adopting a cutoff score ≥17, whose sensitivity is 97%, specificity 95% and accuracy 96%[21].

The measurement invariance analysis that considered the two delivery formats was performed using the Multi-group Confirmatory Factor Analysis (estimated via the maximum likelihood method) at four levels (configural, metric, scalar, and residual). Because the order of the parameters follows a hierarchy, a more complex model is only assessed if the previous one presented invariance.[29,30] Therefore, the configural invariance will be tested (and confirmed if an unrestricted baseline model, which verifies whether the same latent variables explain the same item, presents a good fit without specifying any measurement parameter). If confirmed, the other analyses will follow successively. Significant worsening in the model fit would indicate non-invariance between groups in all the comparisons. Since the literature indicates that Chi-square difference tests detect minor discrepancies without practical or theoretical implications among samples above 200, a decrease in CFI by 0.01 and an increase in RMSEA by 0.015 were considered the best comparison indicators.[32]

RESULTS

1. Socio-demographic characteristics

The final sample (online administration) was composed of 274 individuals, most of whom were women (73.4%), aged 34.76 years old (SD=11.6), with 12 or more years of schooling (78.5%). Approximately 37.60% of the participants lived with a partner, and 80.3% had a paid job. Regarding health conditions, 31.8% of the sample reported current health problems, predominantly hypertension (25.3%) and respiratory problems (11.5%), while 32.1% reported a psychiatric diagnosis. Of these, 55.7% reported depression and 42.0% anxiety. The paper-pencil sample (Barchi-Ferreira & Osório, 2022) comprised 730 individuals from the general population: 67.8% were women, aged 33.84 on average (SD=15.2 years), 69.5% reported 12 or more years of schooling, and 13.7% reported a psychiatric disorder. More detailed information regarding both samples is provided in Supplementary Material SM1.

2. Reliability Indicators

2.1) Analysis of Items, Facets, Domains, and Reliability

The analysis of the items' scores (mean raw scores) indicates that the item with the highest score was P96R (reverse score): "I rarely worry about things" (Mean=2.53; SD=0.71) while the item with the lowest score is P198: "I sometimes hit people to remind them of who is in charge" (Mean=0.06; SD=0.27). Asymmetry and kurtosis indexes showed that none of the items had a normal distribution. A floor effect (more than 15% percentage of the responses were in the category "Very false or often false", Terwee et al. 2007) was found for almost all the items (N=214). In turn, a ceiling effect was found in 42 items (more than 15% of the responses were rated as "Very true or often true"). Data are presented in detail in Supplementary Material SM2 and SM3.

The scores concerning facets and domains are presented in Table 1. All domains and most facets are correlated with a score above 0.50. The scale's internal consistency (Cronbach's alpha) was 0.98. All the facets individually presented appropriate alpha values (>0.70); the domains obtained alpha values above 0.89. The test-retest reliability was performed for each item individually, and most items obtained indicators above 0.51 (vide Supplementary Material SM2). The facets and domains obtained strong/very strong indexes (>0.50).

Table 1: Raw and weighted scores, distribution measures, correlations, and reliability indicators of the different facets and domains of the PID-5 – Online administration (N=274)

Domains	Facets	No. Items	Distribution Shape				Weighted scored		Item-total Correlation	Facet-total Correlation	α	TR ICC (95%)
			Asym	SE	Kurt	SE	Mean	SD				
NA	Emotional Lability	7	0.15	0.15	-0.78	0.29	1.43	0.74	0.49-0.65	0.57	0.83	0.86 (0.75-0.92)
NA	Anxiousness	9	-0.33	0.15	-0.71	0.29	1.75	0.77	0.44-0.77	0.66	0.90	0.83 (0.73-0.89)
NA	Separation Insecurity	7	1.00	0.15	0.51	0.29	0.74	0.67	0.53-0.74	0.41	0.85	0.86 (0.78-0.91)
NA	Submissiveness	4	0.49	0.15	-0.39	0.29	1.01	0.72	0.87-0.93	0.42	0.82	0.83 (0.71-0.90)
NA	Hostility	10	0.47	0.15	-0.16	0.29	1.04	0.65	0.34-0.73	0.69	0.88	0.71 (0.56-0.81)
NA	Perseveration	9	0.58	0.15	0.03	0.29	0.97	0.62	0.40-0.69	0.76	0.84	0.74 (0.60-0.83)
DET	Withdrawal	10	0.43	0.15	-0.65	0.29	1.09	0.76	0.55-0.81	0.59	0.92	0.81 (0.69-0.88)
DET	Intimacy Avoidance	6	1.34	0.15	1.52	0.29	0.63	0.64	0.36-0.74	0.46	0.80	0.63 (0.45-0.76)
DET	Anhedonia	8	0.38	0.15	-0.72	0.29	1.15	0.75	0.44-0.75	0.69	0.89	0.77 (0.64-0.85)
DET	Depressivity	14	0.81	0.15	-0.41	0.29	0.89	0.78	0.50-0.82	0.74	0.95	0.87 (0.80-0.92)
DET	Restrict Affect	7	0.63	0.15	-0.39	0.29	0.90	0.71	0.58-0.66	0.51	0.85	0.82 (0.71-0.88)
DET	Suspiciousness	7	0.21	0.15	-0.52	0.29	1.26	0.58	0.18-0.64	0.63	0.70	0.69 (0.53-0.80)
ANT	Manipulation	5	1.14	0.15	0.77	0.29	0.54	0.57	0.56-0.58	0.47	0.77	0.79 (0.67-0.87)
ANT	Deceitfulness	10	1.52	0.15	2.00	0.29	0.46	0.50	0.30-0.71	0.61	0.87	0.85 (0.76-0.91)
ANT	Grandiosity	6	0.87	0.15	0.60	0.29	0.72	0.55	0.23-0.55	0.37	0.70	0.79 (0.67-0.87)
ANT	Attention Seeking	8	0.83	0.15	-0.10	0.29	0.74	0.65	0.44-0.77	0.47	0.87	0.67 (0.51-0.78)
ANT	Callousness	14	1.68	0.15	2.61	0.29	0.34	0.39	0.15-0.75	0.53	0.82	0.78 (0.67-0.86)
DIS	Irresponsibility	7	1.18	0.15	1.01	0.29	0.51	0.51	0.41-0.52	0.63	0.74	0.75 (0.62-0.84)
DIS	Impulsivity	6	0.64	0.15	-0.25	0.29	0.91	0.71	0.60-0.78	0.58	0.89	0.79 (0.67-0.87)
DIS	Distractibility	9	0.46	0.15	-0.53	0.29	1.14	0.75	0.44-0.78	0.65	0.90	0.85 (0.76-0.91)
DIS	Risk Taking	14	0.62	0.15	0.24	0.29	0.92	0.54	0.39-0.70	0.16	0.87	0.82 (0.72-0.89)
DIS	Rigid Perfectionism	10	0.27	0.15	-1.01	0.29	1.23	0.76	0.58-0.79	0.39	0.90	0.73 (0.59-0.83)
PSY	Unusual Beliefs	8	1.01	0.15	0.48	0.29	0.67	0.61	0.39-0.59	0.54	0.80	0.79 (0.68-0.87)
PSY	Eccentricity	13	0.91	0.15	-0.25	0.29	0.74	0.78	0.73-0.84	0.75	0.96	0.88 (0.81-0.93)
PSY	Cognitive and Perceptual Dysregulation	12	1.19	0.15	1.67	0.29	0.57	0.51	0.35-0.67	0.78	0.85	0.82 (0.72-0.89)

Domains	No. Items	Distribution Shape				Weighted scored		Item-total Correlation	Facet-total Correlation	α	TR ICC (95%)
		Ass	SE	Kurt	SE	Mean	DP				
NA	46	0.02	0.15	-0.68	0.29	1.18	0.51	0.19-0.69	0.80	0.94	0.86 (0.75-0.92)
DET	52	0.47	0.15	-0.46	0.29	0.99	0.56	0.15-0.78	0.61	0.96	0.82 (0.72-0.89)
ANT	43	1.06	0.15	1.06	0.29	0.62	0.43	0.17-0.65	0.81	0.92	0.84 (0.75-0.91)
DIS	46	0.59	0.15	0.62	0.29	0.97	0.39	0.01-0.61	0.77	0.89	0.84 (0.75-0.91)
PSY	33	0.75	0.15	1.01	0.28	1.58	0.69	0.31-0.83	0.77	0.95	0.89 (0.82-0.93)

NA = Negative Affect; ANT = Antagonism; Asym = Asymmetry; Kurt = kurtosis; DET = Detachment; DIS = Disinhibition; SD = Standard Deviation; SE = Standard Error; ICC = Intraclass Correlation Index; PSY = Psychoticism; T/R = Test-Retest reliability; α = Cronbach's alpha.

2.2) Validity indicators based on the Internal Structure

2.2.1) Facets unidimensionality

Three different methods were used to estimate the number of factors associated with the facets. As presented in Table 2, the parallel analysis suggests that most facets present a multi-dimension structure. Even though the other methods predominantly suggested a one-dimension structure, the goodness of fit indexes associated with this condition was satisfactory only for the Intimacy Avoidance, Restricted Affect, Irresponsibility, Impulsivity, Separation Insecurity, Submissiveness, Withdrawal, Anhedonia, and Distractibility facets (N=9). The two-factor structure presented a better fit for the Emotional Lability, Anxiousness, Hostility, Perseveration, Suspiciousness, Grandiosity, Attention Seeking, Rigid Perfectionism, and Eccentricity facets (N=9) (See Supplementary Material SM4). However, the two-factor model was not satisfactory for the Depressivity, Manipulativeness, Deceitfulness, Callousness, Risk Taking, Unusual Beliefs, and Perceptual and Cognitive Dysregulation facets (N=7).

Table 2: Analysis of the facets' unidimensionality according to different delivery formats –Online Administration (N=274).

One-factor model – Measures

Domains	Facets	No. of factors suggested factors			Fit measure for the one-factor model			
		Parallel Analysi	Velicer's MAP	Hull test	χ^2 (*df*)	TLI	RMSEA	RMSR
NA	**Emotional Lability**	2	2	1	640 (14)	0.299	0.404	0.210
NA	**Anxiousness**	3	1	1	250 (27)	0.826	0.174	0.060
NA	**Separation Insecurity**	3	1	1	83 (14)	0.908	0.130	0.050
NA	**Submissiveness**	1	1	-	7.8 (2)	0.964	0.103	0.030
NA	**Hostility**	2	1	1	240 (35)	0.829	0.147	0.070
NA	**Perseveration**	2	1	1	170 (27)	0.827	0.139	0.080
DET	**Withdrawal**	2	1	1	160 (35)	0.928	0.113	0.040
DET	**Intimacy Avoidance**	1	1	1	28 (9)	0.963	0.088	0.040
DET	**Anhedonia**	2	1	1	96 (20)	0.927	0.117	0.050
DET	**Depressivity**	2	1	4	745 (77)	0.830	0.178	0.050
DET	**Restrict Affect**	1	1	1	46 (14)	0.949	0.091	0.040
DET	**Suspiciousness**	2	1	1	88 (14)	0.788	0.139	0.080
ANT	**Manipulation**	3	1	-	95 (5)	0.765	0.256	0.070
ANT	**Deceitfulness**	-	1	1	5824 (35)	0	0.777	0.070

ANT	**Grandiosity**	2	1	1	59 (9)	0.854	0.142	0.060
ANT	**Attention Seeking**	2	1	1	180 (20)	0.855	0.172	0.070
ANT	**Callousness**	-	1	1	710.2(77)	0.740	0.173	0.070
DIS	**Irresponsibility**	2	1	1	59 (14)	0.889	0.109	0.060
DIS	**Impulsivity**	1	1	1	24 (9)	0.979	0.078	0.020
DIS	**Distractibility**	2	1	1	160 (27)	0.900	0.132	0.060
DIS	**Risk Taking**	3	2	3	494 (77)	0.766	0.141	0.080
DIS	**Rigid Perfectionism**	3	1	1	260 (35)	0.842	0.153	0.060
PSY	**Unusual Beliefs**	4	1	1	160 (20)	0.790	0.160	0.070
PSY	**Eccentricity**	2	2	1	609.3 (65)	0.861	0.180	0.040
PSY	**Cognitive and Perceptual Dysregulation**	-	1	2	351.9 (54)	0.799	0.142	0.070

NA= Negative Affect; ANT = Antagonism; DET = Detachment; DIS = Disinhibition; *df* = Degrees of Freedom; PSY = Psychoticism; RMSEA = Root Mean Square Error of Approximation; RMSR = Root Mean Square Residual; TLI = Tucker-Lewis Index; X Chi-Square.

2.2.2) Exploratory Factor Analysis

The factorability of the matrix was verified via KMO (0.923) and Bartlett's test of sphericity (p<0.001). The techniques used to retain factors suggest the presence of four (Hull Test and Velicers MAP) or six factors (Parallel Analysis). The goodness of fit indexes for each factor solution suggested and the five-factor model proposed by Krueger et al. (2012) are presented in Table 3.[11] The distribution of the items' factor loadings in the five factors is presented in Table 4.

Table 3: PID-5 adjustment indexes associated with different factor models analyzed through Exploratory Factor Analysis – Online Administration (N=274)

Indexes	Models		
	4 factors	**5 factors**	**6 factors**
χ^2 **(df)**	747.290 (206)/p<0.0001	537.800 (185)/p<0.0001	400.250 (165)/p<0.0001
TLI	0.804	0.858	0.893
RMSEA	0.098	0.083	0.072
RMSR	0.04	0.03	0.03

df = Degrees of Freedom; RMSEA= Root Mean Square Error of Approximation; RMSR = Root Mean Square of Residuals; TLI = Tucker-Lewis index; X² = Chi-Square.

Table 4: Factor loadings of the facets in the different domains (N=6) based on an Exploratory Factor Analysis of the PID-5 – Online Administration (N=274)

Facets	6 factor model					
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**
Emotional Lability	**0.69**	-0.17	-0.23	0.09	0.20	0.16
Anxiousness	**0.83**	-0.10	-0.08	-0.17	0.04	0.28
Separation Anxiety	**0.51**	0.16	-0.15	-0.01	-0.05	0.11
Submissiveness	**0.57**	0.26	0.01	-0.14	-0.02	-0.21
Hostility	0.17	0.01	0.19	0.26	-0.13	**0.76**
Perseveration	**0.48**	0.05	0.27	-0.08	0.29	-0.05
Withdrawal	0.25	0.00	**0.69**	-0.24	-0.12	0.19
Intimacy Avoidance	0.02	-0.02	**0.58**	0.06	0.06	-0.04
Anhedonia	0.59	-0.08	**0.56**	-0.15	-0.20	0.12
Depressivity	**0.74**	-0.08	0.32	-0.04	-0.09	0.07
Restrict Affect	-0.26	0.08	**0.82**	-0.02	0.15	0.03
Suspiciousness	0.31	0.08	0.07	-0.08	0.09	**0.46**
Manipulation	0.03	**0.78**	0.05	0.09	-0.03	0.01
Deceitfulness	0.28	**0.79**	0.12	0.11	-0.19	-0.01
Grandiosity	-0.19	**0.48**	0.08	-0.03	0.25	0.12
Attention Seeking	0.44	**0.46**	-0.43	0.26	0.15	0.00
Callousness	-0.27	0.26	0.49	0.28	-0.03	**0.33**
Irresponsibility	0.41	0.10	0.24	**0.42**	-0.11	-0.02
Impulsivity	0.35	-0.13	-0.07	**0.58**	0.05	0.26
Distractibility	**0.53**	-0.10	0.27	0.27	0.07	-0.12

Risk Taking	-0.20	0.18	-0.02	**0.53**	0.04	0.04
Rigid Perfectionism	0.14	0.09	0.07	**-0.48**	0.39	0.22
Unusual Beliefs	0.01	-0.02	0.00	0.01	**0.80**	-0.03
Eccentricity	0.14	-0.01	0.35	0.19	**0.48**	-0.05
Cognitive and Perceptual Dysregulation	0.31	-0.02	0.16	0.16	**0.62**	-0.13

The analysis of all goodness of fit indexes indicates that the five- and six-factor models present better adequacy. Even though the five-factor model suggests a greater theoretical association with Krueger's original model, which is also composed of five factors, the distribution of the facets' factor loadings in the domains suggests that the six-factor model is more appropriate. Hence, Factor 1 (Negative Affect) is composed of the model's original facets (Emotional Lability, Anxiousness, Separation Insecurity, Submissiveness, Perseveration, except Hostility) and the Distractibility facet (which originally belonged to the Disinhibition domain). Factor 2 corresponds to the Antagonism facet (Manipulativeness, Deceitfulness, Attention Seeking, and Grandiosity, except for Callousness). Factor 3 comprises the facets of the Detachment domain (Withdrawal, Intimacy Avoidance, Anhedonia, Depressivity, Restricted Affect, except for Suspicioness). Factor 4 corresponds to the Disinhibition domain, except for the Distractability facet, which, as previously described, presented a higher factor loading in Factor 1. Factor 5 corresponds to Psychoticism's original facets (Unusual Beliefs, Eccentricity, and Perceptual and Cognitive Dysregulation), and Factor 6 is composed of the Hostility, Suspiciousness, and Callousness facets.

2.2.3) Response Inconsistency Analysis

The response inconsistency analysis showed that in the sample in which PID-5-SRF was applied in online format, 4.7% of the subjects (N=13) presented indicators at this level. In the sample whose application of the PID-5-SRF was via pencil and paper, the percentage of subjects with inconsistency indicators was 6.3% (N=46). These indices are not statistically different (p=0.35).

3) Measurement Invariance Analysis

A multigroup Confirmatory Factor Analysis was performed considering the different delivery formats. First, the test started at the configural level, and the results indicated that the instrument's structure was unstable (X^2=4362.268, df=530; RMSEA = 0.085; CFI = 0.736), so we did not advance to the remaining analyses.

Discussion

This study's objective was to analyze the psychometric properties of the PID-5-SRF Brazilian version applied online and verify the measurement invariance between the web-based and paper-and-pencil formats. The internal consistency and temporal stability were appropriate (≥0.69). It is similar to the original version in English (α≥0.72;),[11] which was also applied online, and above the Brazilian version applied in the paper-and-pencil format (α≥0.51). Regardless of the administration format, the PID-5-SRF reliability indicators were adequate for all domains and most facets, even among cross-cultural studies.[17,33,34,35]

Almost all items (N=217) had a floor effect (the answers were concentrated on the measure's lowest levels), while a much lower number of items (N=37) presented a ceiling effect. This finding is similar to the study in which the instrument was applied in the paper-and-pencil format. These effects may negatively impact an instrument's sensitivity and specificity, which should be further analyzed. These findings may be linked to the fact that the sample studied, in both studies, was population-based. As these effects can negatively impact the sensitivity and specificity of an instrument, they must be analyzed in more detail, especially in clinical samples, in order to demonstrate whether the applicability of the instrument for this context may or may not be affected.

Testing the facets' unidimensionality showed that many facets did not fit this model, which had already been observed in the Brazilian study in which the instrument was applied in the paper-and-pencil administration[20]. The best fit to the two-factor model of the Emotional Lability, Hostility, Perseveration, Anxiety, Attention Seeking, and Distrust facets was previously reported.[20,35,36,37]

Apart from that, for the first time in this study, the Grandiosity, Rigid

Perfectionism, and Eccentricity facets showed a better fit to the two-factor structure. The Rigid Perfectionism facet was composed of items representing the pursuit of perfection itself and another factor concerning rigidity and other people's perceptions of this behavior. The Eccentricity facet was composed of a factor that grouped items focused on eccentric behaviors and the perception of others (heteroperception) and another factor with items related to eccentric thoughts and perception itself (self-perception). On the other hand, the Grandiosity facet was composed of a factor related to the grandiose quality and importance compared to others and another factor linked to personal achievements and devaluation of others. Unlike the paper-and-pencil administration, the Depressivity, Manipulation, Risk Exposure, Unusual Beliefs, and Cognitive and Perceptual Dysregulation facets did not present an adequate fit in the online administration, not even to the two-dimensional model. The Deceitfulness and Callousness facets did not fit the one-dimension or two-dimension models also in the paper-and-pencil administration.[20]

As for the PID-5-SRF factor structure, the previous literature indicates that the five-factor structure is the most commonly found,[17,35,37,38] illustrating the theoretical model that underpins the instrument.[11] However, in this study, the six-factor structure proved more adequate. This model somehow reflects the original five-factor structure[11]. The most differentiating point is the emergence of a new factor composed of the Hostility, Suspiciousness, and Callousness facets, which portrays a different dimension that brings together traits associated with social maladjustment. This factor can be seen as composed of the pathological variants of the Social Concordance domain of the Severity Indices of Personality Problems (SIPP-118),[39] composed of the Aggression Regulation, Frustration Tolerance, Cooperation, and Respect facets. A better fit to the six-factor structure also observed in the study by Zhang et al.[40] These authors investigated the psychometric properties of PID-5-SRF in the paper-and-pencil administration in a sample of Chinese adolescents. However, the composition of each factor differs significantly from the one found in this study. It also presents little correspondence to the original model, which the authors attributed to the participants' age in which personality is still in formation.

Finally, the PID-5-SRF invariance in the most initial level (configural) according to the format in which the instrument was administered was not

verified, showing that only some items/facets are better explained by the same latent variables. As previously noted, the instrument administered online showed a better fit to the six-factor model, while the paper-and-pencil format fit the five-factor model better.[20] Invariance between the different formats in which psychological instruments are administered is controversial. For example, a previous study involving the Big Five Personality Test – BFQ-2 reported invariance,[4] while another study using instruments to assess emotional functioning (Negative Mood Regulation Scale (NMRS); Trait Meta-Mood Scale (TMMS)) and attachment (Inventory of Parent and Peer Attachment (IPPA)) did not. [41] The presence of measurement invariance considering a given variable is necessary to compare scores between groups with different characteristics, so that differences in the latent construct of interest can be measured.[42,43]

Different variables may impact the answers provided to an instrument when the format in which it is administered differs. Among these variables, potential bias linked to social desirability stands out. However, there are also biases related to the use of technology, such as the respondents' skill level and non-standardization of an instrument's presentation (e.g., different screens may be used when the instrument is applied online, such as a desktop, notebook, or smartphone with different resolutions). There is also sampling bias, considering that participants in online environments are subject to numerous physical and psychological variables and may become more distracted than when taking tests under supervised conditions.[44,45] It is noteworthy that the rate of subjects whose responses to the PID-5-SRF were considered inconsistent did not differ significantly between the samples.

In this study, although statistically significant differences were observed in some variables of the samples recruited for the two application formats, in general, they are not very significant, maintaining the general profile of the samples homogeneous. However, a slightly higher percentage of people with psychopathology indicators may have an influence, even though a previous study showed measurement invariance among clinical and community samples[17.]

This is the first study investigating whether the format in which the PID-5 is administered influences the data variance. In addition to the samples' clinical and non-clinical conditions, previous studies have already analyzed the impact of culture[33,46] and sex[47], reporting invariance at various levels. However, the study

by Sorrel et al. is an exception. [46] It analyzed a larger number of cultures and did not report invariance at the scalar level.

The conclusion is that the PID-5-SRF online administered presents good psychometric indicators, compatible with the paper-and-pencil administration, reinforcing previous results reported in the literature and its feasibility for assessing pathological personality traits. However, the instrument structure seems to differ, whether at the facets or domains level, depending on the type of application. This fact has no implications for the applicability of the instrument in any of the analyzed formats. Hence, those interested in using PID-5 at a clinical or research level should consider this aspect to avoid measurement bias. Based on these results, comparing and interpreting data collected through different formats is not recommended, given a lack of invariance, as it may influence diagnostic reasoning and clinical decisions.

For local ethical reasons, the data will be available to interested parties upon request to the authors by email anabarchif@gmail.com

Conflicts of interest? No

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Handling Editor: Dr. Adriane Rosa

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Supplementary material

Supplementary Material SM1: Sociodemographic characterization of the samples in which the PID-5 was administered online and in paper-and-pencil formats.

Variables	Online Administration N=274		Paper-and-pencil administration N=730		Statistic (p value)
	N	%	N	%	
Sex					0.09
Male	73	26.60	235	32.20	
Female	201	73.40	495	67.80	
Age (Mean; SD)	34.76 (11.63)		33.84 (15.15)		0.31
Children					0.47
No	163	59.50	453	62.10	
Yes	110	40.10	265	36.30	
Not reported	1	0.40	12	1.60	
Marital Status					0.01*
No partner	161	58.80	493	67.50	
With partner	103	37.60	227	31.10	
Not reported	10	3.60	10	1.40	
Schooling					0.003*
Up to 12 years	58	21.20	223	30.50	
>12 years	215	78.50	507	69.50	
Not reported	1	0.40	0	0.00	
Working condition					0.85
Paid job[1]	220	80.30	590	80.80	
Unemployed	53	19.30	130	17.80	
Not reported	1	0.40	10	1.40	
Health problems					<0.001*
No	167	60.90	570	78.10	
Yes, in the past	19	6.90	54	7.40	
Yes, currently	87	31.80	101	13.80	
Not reported	1	0.40	5	0.70	
Psychiatric diagnosis					<0.001*
No	185	67.50	624	85.50	
Yes	88	32.10	100	13.70	
Not reported	1	0.40	6	0.80	
Psychotherapy					<0.001*
No	118	43.10	461	63.20	
Yes, in the past	100	36.50	166	22.70	
Yes, currently	56	20.40	93	12.70	
Not reported	0	0.00	10	1.40	

Continuous use of medications					0.01*
No	151	55.10	467	64.00	
Yes	123	44.90	259	35.50	
Not reported	0	0.00	4	0.50	
Tobacco consumption					0.59
No	229	83.60	624	85.50	
Yes, in the past	26	9.50	43	5.90	
Yes, currently	19	6.90	54	7.40	
Not reported	0	0.00	9	1.20	
Alcohol consumption					0.001*
No	88	32.10	316	43.30	
Yes, in the past	25	9.10	37	5.10	
Yes, currently	161	58.80	370	50.70	
Not reported	0	0.00	7	0.90	
Troubles with the law					0.43
No	265	96.70	713	97.70	
Yes	9	3.30	11	1.50	
Not reported	0	0.00	6	0.80	

[1]= Employed individuals and students; SD=Standard Deviation.

Supplementary Material SM2 – Raw scores, Distribution Measures, Item-total Correlation, and

Test-Retest Reliability of the PID-5 – Online Administration (N=274)

Item	Raw Scores						Item-total Correlation	T/R
			Distribution Measure					
	Mean	SD	Asym	(SE)	Kurt	(SE)		ICC (95%)
P1	1.42	0.99	-0.09	0.15	-1.09	0.29	0.54	0.65 (0.49-0.77)
P2	0.37	0.72	1.90	0.15	2.80	0.29	0.31	0.55 (0.35-0.70)
P3	0.45	0.78	1.60	0.15	1.49	0.29	0.40	0.54 (0.34-0.69)
P4	1.08	0.88	0.31	0.15	-0.81	0.29	0.50	0.59 (0.39-0.72)
P5	0.98	1.07	0.62	0.15	-1.01	0.29	0.64	0.75 (0.61-0.84)
P6	1.22	1.02	0.33	0.15	-1.03	0.29	0.44	0.64 (0.47-0.77)
P7R	0.97	0.97	0.53	0.15	-0.91	0.29	0.02	0.33 (0.09-0.53)
P8	1.16	1.08	0.33	0.15	-1.24	0.29	0.36	0.68 (0.52-0.79)
P9	1.22	0.90	0.16	0.15	-0.84	0.29	0.35	0.61 (0.43-0.74)
P10	1.32	1.03	0.09	0.15	-1.18	0.29	0.49	0.52 (0.32-0.68)
P11	0.08	0.35	5.28	0.15	30.77	0.29	0.29	0.82 (0.72-0.89)
P12	1.05	1.06	0.61	0.15	-0.89	0.29	0.31	0.75 (0.62-0.84)
P13	0.74	0.95	1.04	0.15	-0.06	0.29	0.38	0.71 (0.57-0.81)
P14	0.67	0.84	0.98	0.15	0.00	0.29	0.45	0.52 (0.32-0.68)
P15	0.93	0.93	0.57	0.15	-0.76	0.29	0.31	0.43 (0.21-0.61)
P16	0.78	0.84	0.81	0.15	-0.12	0.29	0.50	0.71 (0.56-0.81)
P17	0.76	0.84	0.73	0.15	-0.51	0.29	0.53	0.70 (0.55-0.81)
P18	1.43	1.09	0.04	0.15	-1.30	0.29	0.66	0.65 (0.48-0.77)
P19	0.34	0.71	2.11	0.15	3.72	0.29	0.39	0.71 (0.56-0.81)
P20	1.74	1.07	-0.37	0.15	-1.09	0.29	0.50	0.78 (0.66-0.86)
P21	0.86	1.00	0.77	0.15	-0.69	0.29	0.65	0.70 (0.55-0.81)
P22	0.93	0.85	0.61	0.15	-0.31	0.29	0.55	0.54 (0.35-0.69)
P23	0.99	0.99	0.57	0.15	-0.86	0.29	0.60	0.59 (0.40-0.73)
P24	0.77	0.94	0.87	0.15	-0.47	0.29	0.65	0.66 (0.50-0.78)
P25	0.69	0.92	0.99	0.15	-0.28	0.29	0.61	0.71 (0.56-0.81)
P26	0.96	0.99	0.65	0.15	-0.74	0.29	0.58	0.65 (0.48-0.77)
P27	1.17	1.14	0.42	0.15	-1.27	0.29	0.64	0.64 (0.48-0.77)
P28	1.12	0.96	0.45	0.15	-0.77	0.29	0.57	0.65 (0.48-0.77)
P29	0.99	0.95	0.52	0.15	-0.84	0.29	0.56	0.60 (0.42-0.73)
P30R	1.3	1.00	0.21	0.15	-1.03	0.29	0.20	0.75 (0.62-0.84)
P31	0.26	0.60	2.34	0.15	4.94	0.29	0.42	0.56 (0.37-0.71)
P32	0.92	0.99	0.69	0.15	-0.70	0.29	0.48	0.65 (0.49-0.78)
P33	0.88	1.01	0.74	0.15	-0.74	0.29	0.67	0.65 (0.48-0.77)
P34	1.16	1.04	0.34	0.15	-1.11	0.29	0.33	0.57 (0.38-0.72)
P35R	1.53	1.13	-0.01	0.15	-1.38	0.29	-0.13	0.57 (0.38-0.71)
P36	0.46	0.84	1.73	0.15	1.91	0.29	0.50	0.55 (0.35-0.70)
P37	0.2	0.59	3.22	0.15	10.25	0.29	0.42	0.73 (0.59-0.83)
P38	1.5	0.97	0.01	0.15	-0.98	0.29	0.53	0.78 (0.66-0.86)
P39	0.33	0.71	2.23	0.15	4.37	0.29	0.31	0.56 (0.36-0.70)
P40	0.48	0.80	1.65	0.15	1.87	0.29	0.31	0.69 (0.54-0.80)
P41	0.38	0.69	1.80	0.15	2.56	0.29	0.48	0.72 (0.57-0.82)
P42	0.46	0.79	1.69	0.15	2.01	0.29	0.40	0.51 (0.31-0.67)
P43	0.81	0.89	0.69	0.15	-0.67	0.29	0.51	0.41 (0.19-0.60)
P44	0.21	0.57	2.83	0.15	7.31	0.29	0.39	0.24 (0.00-0.46)

P45	0.89	0.95	0.69	0.15	-0.66	0.29	0.50	0.47 (0.25-0.64)
P46	0.88	0.92	0.80	0.15	-0.26	0.29	0.37	0.36 (0.13-0.56)
P47	0.92	1.02	0.84	0.15	-0.46	0.29	0.36	0.69 (0.53-0.80)
P48	0.46	0.73	1.47	0.15	1.35	0.29	0.37	0.75 (0.63-0.84)
P49	1.42	0.98	0.02	0.15	-1.01	0.29	0.28	0.52 (0.31-0.67)
P50	1.27	1.06	0.26	0.15	-1.18	0.29	0.38	0.28 (0.00-0.52)
P51	1.23	1.03	0.29	0.15	-1.08	0.29	0.43	0.53 (0.33-0.69)
P52	0.77	0.95	0.87	0.15	-0.50	0.29	0.68	0.75 (0.62-0.84)
P53	0.3	0.61	1.96	0.15	2.94	0.29	0.48	0.62 (0.44-0.75)
P54	0.22	0.55	2.53	0.15	5.84	0.29	0.40	0.53 (0.33-0.68)
P55	0.56	0.82	1.25	0.15	0.49	0.29	0.63	0.72 (0.59-0.82)
P56	0.43	0.75	1.63	0.15	1.66	0.29	0.43	0.67 (0.51-0.79)
P57	0.43	0.82	1.85	0.15	2.34	0.29	0.26	0.74 (0.60-0.83)
P58R	0.76	0.83	0.75	0.15	-0.41	0.29	0.32	0.65 (0.49-0.77)
P59	1.09	1.07	0.36	0.15	-1.26	0.29	0.38	0.49 (0.28-0.66)
P60	0.77	0.84	0.87	0.15	0.06	0.29	0.52	0.36 (0.13-0.56)
P61	1.45	1.10	0.06	0.15	-1.30	0.29	0.65	0.61 (0.43-0.74)
P62	1.32	1.09	0.21	0.15	-1.26	0.29	0.55	0.75 (0.38-0.72)
P63	0.86	0.83	0.53	0.15	-0.69	0.29	0.40	0.50 (0.30-0.67)
P64	0.32	0.70	2.29	0.15	4.76	0.29	0.37	0.77 (0.65-0.85)
P65	1.06	1.02	0.43	0.15	-1.06	0.29	0.32	0.57 (0.38-0.72)
P66	0.93	1.07	0.71	0.15	-0.89	0.29	0.63	0.59 (0.40-0.73)
P67	0.55	0.79	1.16	0.15	0.20	0.29	0.24	0.61 (0.44-0.75)
P68	1.03	0.98	0.56	0.15	-0.77	0.29	0.58	0.62 (0.44-0.75)
P69	1.11	0.95	0.36	0.15	-0.89	0.29	0.28	0.34 (0.10-0.54)
P70	0.79	0.99	0.88	0.15	-0.55	0.29	0.62	0.80 (0.69-0.87)
P71	0.75	0.96	0.95	0.15	-0.34	0.29	0.68	0.69 (0.54-0.80)
P72	0.26	0.63	2.56	0.15	6.13	0.29	0.35	0.47 (0.25-0.64)
P73	0.24	0.59	2.77	0.15	7.67	0.29	0.32	0.31 (0.07-0.51)
P74	0.64	0.85	1.13	0.15	0.35	0.29	0.43	0.65 (0.49-0.77)
P75	0.99	0.96	0.59	0.15	-0.70	0.29	0.47	0.61 (0.44-0.75)
P76	0.54	0.81	1.31	0.15	0.67	0.29	0.48	0.69 (0.54-0.80)
P77	0.38	0.69	1.66	0.15	1.72	0.29	0.34	0.37 (0.14-0.57)
P78	0.88	0.93	0.69	0.15	-0.63	0.29	0.41	0.63 (0.45-0.76)
P79	1.77	1.07	-0.39	0.15	-1.09	0.29	0.48	0.53 (0.33-0.68)
P80	0.96	0.93	0.62	0.15	-0.56	0.29	0.57	0.59 (0.41-0.73)
P81	0.41	0.80	1.89	0.15	2.57	0.29	0.57	0.76 (0.63-0.84)
P82	1.17	1.02	0.26	0.15	-1.16	0.29	0.64	0.59 (0.40-.73)
P83	1.33	1.10	0.19	0.15	-1.31	0.29	0.71	0.66 (0.50-0.78)
P84	0.44	0.78	1.69	0.15	1.86	0.29	0.34	0.40 (0.17-0.58)
P85	0.87	0.91	0.64	0.15	-0.69	0.29	0.38	0.58 (0.39-0.72)
P86	1.28	1.11	0.26	0.15	-1.30	0.29	0.47	0.68 (0.52-0.79)
P87R	1.69	1.03	-0.25	0.15	-1.06	0.29	-0.14	0.44 (0.22-0.62)
P88	0.97	1.01	0.62	0.15	-0.83	0.29	0.52	0.60 (0.42-0.73)
P89	0.58	0.92	1.45	0.15	0.88	0.29	0.37	0.62 (0.44-0.75)
P90R	0.81	1.11	0.98	0.15	-0.59	0.29	0.07	0.08 (-0.16-0.32)
P91	0.91	1.03	0.76	0.15	-0.71	0.29	0.26	0.55 (0.35-0.67)
P92	1.34	1.05	0.16	0.15	-1.17	0.29	0.44	0.72 (0.59-0.82)
P93	1.34	1.13	0.19	0.15	-1.35	0.29	0.64	0.54 (0.34-0.69)
P94	1.11	1.13	0.45	0.15	-1.26	0.29	0.41	0.53 (0.33-0.69)

P95	1.43	1.11	0.04	0.15	-1.33	0.29	0.61	0.66 (0.50-0.78)
P96R	2.5	0.74	-1.39	0.15	1.26	0.29	0.10	0.63 (0.46-0.76)
P97R	0.84	0.98	0.99	0.15	-0.06	0.29	0.23	0.51 (0.30-0.67)
P98R	0.65	0.80	1.02	0.15	0.25	0.29	0.19	0.48 (0.26-0.64)
P99	0.84	1.11	0.92	0.15	-0.68	0.29	0.31	0.60 (0.42-0.74)
P100	0.92	1.02	0.75	0.15	-0.66	0.29	0.56	0.73 (0.59-0.82)
P101	1.04	1.07	0.48	0.15	-1.18	0.29	0.48	0.60 (0.42-0.74)
P102	1.96	1.02	-0.51	0.15	-0.96	0.29	0.00	0.74 (0.61-0.83)
P103	1.65	1.00	-0.21	0.15	-1.00	0.29	0.46	0.39 (0.16-0.57)
P104	1.3	1.14	0.22	0.15	-1.40	0.29	0.63	0.70 (0.55-0.80)
P105	1.24	1.04	0.20	0.15	-1.20	0.29	0.47	0.57 (0.38-0.72)
P106	0.6	0.95	1.41	0.15	0.73	0.29	0.37	0.67 (0.51-0.79)
P107	1.05	1.00	0.40	0.15	-1.08	0.29	0.28	0.63 (0.45-0.75)
P108	0.4	0.79	1.97	0.15	2.91	0.29	0.38	0.54 (0.38-0.70)
P109	2.11	0.98	-0.74	0.15	-0.60	0.29	0.51	0.66 (0.49-0.78)
P110	1.9	1.08	-0.55	0.15	-0.99	0.29	0.51	0.70 (0.55-0.81)
P111	0.87	1.01	0.71	0.15	-0.84	0.29	0.16	0.56 (0.36-0.70)
P112	1.38	0.93	0.04	0.15	-0.89	0.29	0.14	0.51 (0.30-0.67)
P113	0.67	0.87	1.10	0.15	0.25	0.29	0.31	0.54 (0.35-0.69)
P114	0.58	0.78	1.09	0.15	0.11	0.29	0.27	0.55 (0.36-0.70)
P115	0.95	1.03	0.61	0.15	-0.98	0.29	0.18	0.55 (0.35-0.70)
P116	0.59	0.84	1.19	0.15	0.33	0.29	0.45	0.41 (0.19-0.60)
P117	1.64	1.01	-0.18	0.15	-1.06	0.29	0.36	0.56 (0.37-0.71)
P118	1.35	1.01	0.13	0.15	-1.10	0.29	0.58	0.69 (0.54-0.80)
P119	0.46	0.83	1.73	0.15	1.91	0.29	0.54	0.67 (0.51-0.79)
P120	0.88	0.98	0.75	0.15	-0.63	0.29	0.30	0.66 (0.49-0.78)
P121	1.33	1.01	0.10	0.15	-1.12	0.29	0.63	0.75 (0.62-0.84)
P122	1.68	1.07	-0.25	0.15	-1.18	0.29	0.21	0.68 (0.53-0.80)
P123	1.01	1.02	0.51	0.15	-1.01	0.29	0.36	0.61 (0.43-0.74)
P124	1.17	1.06	0.35	0.15	-1.15	0.29	0.66	0.59 (0.40-0.73)
P125	0.39	0.73	1.83	0.15	2.38	0.29	0.39	0.76 (0.64-0.85)
P126	0.77	0.91	0.98	0.15	-0.01	0.29	0.46	0.68 (0.52-0.79)
P127	0.88	1.05	0.84	0.15	-0.64	0.29	0.32	0.53 (0.32-0.68)
P128	0.71	0.84	1.00	0.15	0.20	0.29	0.60	0.49 (0.28-0.66)
P129	0.62	0.89	1.27	0.15	0.54	0.29	0.34	0.59 (0.40-0.73)
P130	2.09	1.02	-0.77	0.15	-0.63	0.29	0.51	0.85 (0.76-0.90)
P131R	1.69	0.94	0.01	0.15	-1.02	0.29	0.32	0.67 (0.51-0.79)
P132	1.5	1.01	0.02	0.15	-1.07	0.29	0.47	0.73 (0.59-0.82)
P133	0.98	0.98	0.58	0.15	-0.79	0.29	0.60	0.62 (0.44-0.75)
P134	0.15	0.43	3.05	0.15	8.88	0.29	0.44	0.54 (0.34-0.69)
P135	1.46	1.07	0.07	0.15	-1.23	0.29	0.38	0.64 (0.48-0.77)
P136	0.87	0.90	0.65	0.15	-0.60	0.29	0.39	0.53 (0.33-0.68)
P137	1.03	0.94	0.48	0.15	-0.78	0.29	0.51	0.41 (0.18-0.59)
P138	1.04	1.06	0.57	0.15	-0.97	0.29	0.69	0.61 (0.44-0.75)
P139	0.22	0.59	3.07	0.15	9.36	0.29	0.39	0.49 (0.29-0.66)
P140	1.41	1.03	0.06	0.15	-1.14	0.29	0.37	0.57 (0.38-0.71)
P141	1.16	1.07	0.33	0.15	-1.22	0.29	0.58	0.69 (0.53-0.80)
P142R	0.61	0.77	1.10	0.15	0.53	0.29	0.17	0.29 (0.06-0.50)
P143	0.41	0.82	1.94	0.15	2.61	0.29	0.23	0.66 (0.50-0.78)
P144	1.19	1.03	0.32	0.15	-1.09	0.29	0.54	0.68 (0.52-0.79)

P145	0.56	0.88	1.47	0.15	1.12	0.29	0.39	0.52 (0.32-0.68)
P146	0.7	0.93	1.13	0.15	0.19	0.29	0.41	0.71 (0.57-0.81)
P147	1.04	1.01	0.57	0.15	-0.82	0.29	0.39	0.62 (0.45-0.75)
P148	0.58	0.90	1.35	0.15	0.61	0.29	0.59	0.85 (0.80-0.92)
P149	0.51	0.82	1.47	0.15	1.15	0.29	0.40	0.67 (0.51-0.72)
P150	0.66	0.94	1.14	0.15	0.05	0.29	0.25	0.35 (0.12-0.55)
P151	0.91	1.01	0.75	0.15	-0.66	0.29	0.66	0.63 (0.45-0.75)
P152	0.64	0.90	1.17	0.15	0.24	0.29	0.66	0.80 (0.69-0.87)
P153	0.26	0.61	2.38	0.15	4.83	0.29	0.36	0.48 (0.27-0.65)
P154	0.32	0.73	2.24	0.15	4.02	0.29	0.45	0.04 (-0.21-0.28)
P155R	1.54	1.01	0.04	0.15	-1.09	0.29	0.51	0.55 (0.35-0.70)
P156	0.49	0.77	1.36	0.15	0.76	0.29	0.43	0.58 (0.40-0.72)
P157	0.88	0.97	0.72	0.15	-0.64	0.29	0.70	0.67 (0.51-0.78)
P158	1.24	1.02	0.27	0.15	-1.06	0.29	0.54	0.65 (0.49-0.77)
P159	0.44	0.73	1.56	0.15	1.52	0.29	0.38	0.54 (0.34-0.69)
P160	0.5	0.84	1.57	0.15	1.36	0.29	0.39	0.68 (0.51-0.80)
P161	1.04	0.98	0.43	0.15	-0.98	0.29	0.51	0.66 (0.50-0.78)
P162	0.37	0.71	1.99	0.15	3.34	0.29	0.48	0.52 (0.32-0.68)
P163	0.86	1.02	0.80	0.15	-0.68	0.29	0.66	0.67 (0.51-0.78)
P164R	1.75	0.95	-0.33	0.15	-0.79	0.29	-0.07	0.41 (0.18-0.59)
P165	1.53	1.04	-0.12	0.15	-1.15	0.29	0.17	0.66 (0.50-0.78)
P166	0.24	0.57	2.54	0.15	6.21	0.29	0.39	0.47 (0.25-0.64)
P167	1.06	1.00	0.41	0.15	-1.05	0.29	0.40	0.76 (0.63-0.85)
P168	1.19	1.08	0.39	0.15	-1.15	0.29	0.70	0.60 (0.42-0.74)
P169	0.57	0.90	1.35	0.15	0.56	0.29	0.61	0.86 (0.78-0.91)
P170	0.54	0.80	1.32	0.15	0.78	0.29	0.53	0.53 (0.33-0.68)
P171	0.87	0.99	0.78	0.15	-0.60	0.29	0.51	0.60 (0.42-0.73)
P172	0.64	0.89	1.13	0.15	0.10	0.29	0.71	0.71 (0.56-0.81)
P173	0.64	0.85	1.10	0.15	0.17	0.29	0.29	0.53 (0.33-0.68)
P174	1.49	1.07	-0.04	0.15	-1.25	0.29	0.57	0.63 (0.47-0.76)
P175	0.74	0.90	0.95	0.15	-0.13	0.29	0.21	0.49 (0.27-0.65)
P176	1.24	1.03	0.29	0.15	-1.07	0.29	0.33	0.63 (0.46-0.76)
P177R	1.55	1.07	-0.15	0.15	-1.23	0.29	0.13	0.14 (-0.11-0.37)
P178	0.32	0.72	2.35	0.15	4.77	0.29	0.52	0.65 (0.48-0.77)
P179	1.35	1.03	0.07	0.15	-1.19	0.29	0.02	0.52 (0.32-0.68)
P180	0.7	0.90	0.96	0.15	-0.28	0.29	0.28	0.65 (0.48-0.77)
P181	1.04	1.04	0.54	0.15	-0.96	0.29	0.66	0.69 (0.54-0.80)
P182	0.85	0.99	0.84	0.15	-0.48	0.29	0.56	0.58 (0.39-0.72)
P183	0.41	0.72	1.80	0.15	2.63	0.29	0.25	0.80 (0.67-0.87)
P184	0.79	0.94	0.89	0.15	-0.32	0.29	0.40	0.77 (0.64-0.85)
P185	0.62	0.87	1.10	0.15	-0.03	0.29	0.67	0.64 (0.47-0.77)
P186	1.11	1.04	0.40	0.15	-1.10	0.29	0.45	0.66 (0.50-0.78)
P187	0.47	0.79	1.59	0.15	1.58	0.29	0.35	0.43 (0.20-0.61)
P188	1.55	1.05	-0.04	0.15	-1.19	0.29	0.51	0.64 (0.45-0.76)
P189	0.92	0.96	0.72	0.15	-0.53	0.29	0.53	0.52 (0.32-0.68)
P190	0.94	1.00	0.63	0.15	-0.85	0.29	0.54	0.66 (0.50-0.78)
P191	0.96	1.03	0.66	0.15	-0.82	0.29	0.47	0.50 (0.29-0.66)
P192	0.2	0.57	2.90	0.15	7.71	0.29	0.37	0.64 (0.47-0.76)
P193	1.05	1.11	0.56	0.15	-1.11	0.29	0.66	0.75 (0.62-0.84)
P194	0.82	1.03	0.85	0.15	-0.65	0.29	0.48	0.63 (0.46-0.76)

P195	0.43	0.74	1.62	0.15	1.79	0.29	0.31	0.43 (0.21-0.61)
P196	1.05	0.99	0.44	0.15	-0.99	0.29	0.29	0.66 (0.50-0.78)
P197	0.36	0.73	1.99	0.15	3.15	0.29	0.30	0.58 (0.40-0.72)
P198	0.07	0.30	4.62	0.15	22.56	0.29	0.18	0.50 (0.29-0.66)
P199	1.05	1.00	0.62	0.15	-0.70	0.29	0.56	0.72 (0.57-0.82)
P200	0.32	0.66	2.23	0.15	4.72	0.29	0.45	0.68 (0.53-0.79)
P201	0.5	0.87	1.63	0.15	1.54	0.29	0.42	0.61 (0.42-0.74)
P202	1	0.94	0.51	0.15	-0.77	0.29	0.35	0.51 (0.30-0.67)
P203	0.54	0.84	1.54	0.15	1.58	0.29	0.40	0.50 (0.29-0.66)
P204	1.13	1.02	0.35	0.15	-1.08	0.29	0.50	0.67 (0.51-0.78)
P205	0.73	0.96	1.00	0.15	-0.30	0.29	0.67	0.87 (0.80-0.92)
P206	0.3	0.62	1.97	0.15	2.92	0.29	0.44	0.50 (0.29-0.66)
P207	0.36	0.74	2.09	0.15	3.69	0.29	0.29	0.49 (0.27-0.65)
P208	0.48	0.82	1.71	0.15	2.03	0.29	0.47	0.64 (0.47-0.77)
P209	0.7	0.98	1.14	0.15	0.02	0.29	0.49	0.72 (0.57-0.82)
P210R	0.32	0.61	2.05	0.15	4.17	0.29	0.34	0.85 (0.77-0.91)
P211	0.68	0.87	1.03	0.15	0.04	0.29	0.33	0.51 (0.31-0.67)
P212	1.09	1.09	0.47	0.15	-1.17	0.29	0.66	0.69 (0.53-0.80)
P213	0.78	1.01	0.98	0.15	-0.36	0.29	0.61	0.74 (0.61-0.84)
P214	0.68	0.91	1.20	0.15	0.44	0.29	0.54	0.77 (0.65-0.85)
P215R	1.21	1.04	0.28	0.15	-1.14	0.29	-0.01	0.52 (0.31-0.68)
P216	0.77	0.92	0.94	0.15	-0.15	0.29	0.50	0.46 (0.25-0.64)
P217	0.32	0.68	2.17	0.15	4.13	0.29	0.51	0.63 (0.46-0.76)
P218	0.42	0.69	1.56	0.15	1.69	0.29	0.48	0.43 (0.21-0.61)
P219	0.19	0.49	2.85	0.15	8.25	0.29	0.42	0.60 (0.42-0.74)
P220	1.35	1.04	0.06	0.15	-1.20	0.29	0.31	0.53 (0.33-0.69)

Asym = Asymmetry; Kurt = Kurtosis; SD = Standard Deviation; SE= Standard Error; ICC = Intraclass Correlation Coefficient; R= Items with inverted scores already computed; T/R = Test-Retest Reliability.

Supplementary Material SM3: Percentage of responses in the different response categories of the PID-5 items – Online administration (N=274)

Item	Score			
	0	**1**	**2**	**3**
P1	23.7	24.1	39.1	13.1
P2	74.8	15.0	8.4	1.8
P3	70.8	15.7	11.3	2.2
P4	29.9	37.6	27.4	5.1
P5	46.7	20.4	21.2	11.7
P6	29.6	32.5	24.1	13.9
P7R	41.6	27.0	24.5	6.9
P8	37.6	22.3	26.6	13.5
P9	24.1	36.9	31.8	7.3
P10	27.7	25.9	32.5	13.9
P11	94.5	3.6	1.5	0.4
P12	39.4	29.9	16.8	13.9
P13	54.0	24.8	14.2	6.9
P14	53.6	28.5	15.0	2.9
P15	40.9	30.7	22.6	5.8
P16	44.5	36.5	15.3	3.6
P17	47.4	31.4	18.6	2.6
P18	26.6	24.5	28.5	20.4
P19	77.4	13.1	7.3	2.2
P20	17.9	19.0	33.9	29.2
P21	49.6	22.6	19.7	8.0
P22	35.0	42.0	18.2	4.7
P23	41.2	27.7	22.3	8.8
P24	52.9	22.6	19.0	5.5
P25	57.7	19.7	18.2	4.4
P26	42.0	29.2	19.7	9.1
P27	39.4	23.0	19.0	18.6
P28	30.7	36.9	22.3	10.2
P29	39.1	30.3	23.7	6.9
P30R	25.5	32.8	27.7	13.9
P31	81.0	12.4	5.8	0.7
P32	44.2	27.7	19.7	8.4
P33	48.5	23.0	20.1	8.4
P34	34.7	27.0	26.3	12.0
P35R	24.1	25.9	23.4	26.6
P36	71.9	14.2	9.5	4.4
P37	87.2	7.3	3.6	1.8
P38	17.2	33.2	32.1	17.5
P39	78.1	13.1	6.2	2.6
P40	68.2	19.3	8.8	3.6
P41	72.3	18.6	7.7	1.5
P42	47.1	28.1	21.2	3.6
P43	86.5	6.9	5.8	0.7
P44	86.5	6.9	5.8	0.7
P45	44.5	28.5	20.4	6.6

P46	41.6	35.8	15.3	7.3
P47	44.5	31.0	12.8	11.7
P48	66.4	22.6	9.5	1.5
P49	20.8	30.7	33.9	14.6
P50	30.3	28.5	25.2	16.1
P51	30.3	30.3	25.9	13.5
P52	53.3	21.9	19.3	5.5
P53	77.4	15.3	6.9	0.4
P54	83.6	10.9	5.1	0.4
P55	62.4	21.5	13.5	2.6
P56	71.2	16.4	10.6	1.8
P57	74.5	12.4	9.1	4.0
P58R	46.7	33.2	17.5	2.6
P59	41.2	19.0	28.8	10.9
P60	44.9	37.2	13.9	4.0
P61	25.2	27.0	25.5	22.3
P62	29.6	27.4	24.5	18.6
P63	39.8	36.5	21.2	2.6
P64	78.1	13.9	5.5	2.6
P65	39.1	25.5	25.9	9.5
P66	48.9	20.4	19.3	11.3
P67	62.0	22.3	14.2	1.5
P68	37.2	32.5	20.8	9.5
P69	31.8	33.6	26.3	8.4
P70	54.4	19.3	19.0	7.3
P71	55.1	21.2	17.5	6.2
P72	82.5	10.6	5.5	1.5
P73	83.2	11.3	4.0	1.5
P74	56.6	26.6	13.1	3.6
P75	38.0	33.2	20.4	8.4
P76	63.5	21.2	12.8	2.6
P77	72.6	17.2	9.5	0.7
P78	44.5	29.2	20.4	5.8
P79	17.2	19.3	32.8	30.7
P80	38.0	35.4	19.7	6.9
P81	74.8	12.8	8.8	3.6
P82	33.9	25.5	29.9	10.6
P83	30.3	25.5	24.8	19.3
P84	71.5	15.7	10.2	2.6
P85	44.2	29.6	21.5	4.7
P86	32.5	25.5	23.0	19.0
P87R	16.1	24.5	33.9	25.5
P88	42.7	27.0	20.8	9.5
P89	66.1	16.8	10.6	6.6
P90R	58.8	14.6	13.1	13.5
P91	47.8	24.1	17.9	10.2
P92	27.0	28.8	27.7	16.4
P93	30.7	25.5	22.6	21.2
P94	42.7	19.3	22.3	15.7
P95	27.4	23.4	28.1	21.2

P96R	1.8	9.1	25.9	63.1
P97R	46.7	32.8	10.2	10.2
P98R	52.9	31.8	12.8	2.6
P99	57.3	15.0	14.6	13.1
P100	45.3	27.4	17.2	10.2
P101	44.2	19.0	25.5	11.3
P102	10.2	23.0	27.4	39.4
P103	15.7	26.3	35.8	22.3
P104	34.7	21.2	24.1	20.1
P105	31.8	25.2	29.9	13.1
P106	65.3	16.8	10.6	7.3
P107	39.1	25.2	27.7	8.0
P108	75.5	12.8	8.0	3.6
P109	8.0	18.6	28.1	45.3
P110	15.3	17.2	29.6	38.0
P111	50.4	19.7	22.3	7.7
P112	20.1	33.6	35.0	11.3
P113	55.5	26.6	13.5	4.4
P114	59.1	25.5	13.9	1.5
P115	46.7	20.8	23.4	9.1
P116	60.9	21.9	14.2	2.9
P117	16.1	27.0	33.6	23.4
P118	24.8	30.3	29.9	15.0
P119	72.3	13.9	9.9	4.0
P120	46.7	26.3	19.0	8.0
P121	26.3	28.1	32.1	13.5
P122	18.6	22.6	31.4	27.4
P123	42.0	24.5	24.5	9.1
P124	35.0	26.3	25.2	13.5
P125	74.5	14.2	9.5	1.8
P126	49.6	30.3	13.9	6.2
P127	50.4	22.6	15.7	11.3
P128	50.4	32.5	13.1	4.0
P129	60.9	21.5	12.4	5.1
P130	10.2	16.8	27.0	46.0
P131R	8.8	38.0	28.8	24.5
P132	18.6	32.1	29.9	19.3
P133	40.1	29.9	21.5	8.4
P134	88.3	8.8	2.9	0.0
P135	23.0	29.6	26.3	21.2
P136	42.7	32.1	20.4	4.7
P137	35.4	33.9	23.4	7.3
P138	41.2	26.3	19.7	12.8
P139	85.8	8.8	3.6	1.8
P140	23.7	28.8	30.7	16.8
P141	36.9	23.4	26.3	13.5
P142R	54.7	32.1	10.9	2.2
P143	76.6	10.2	9.1	4.0
P144	32.5	28.8	25.9	12.8
P145	64.6	20.1	9.9	5.5

P146	55.8	24.8	12.8	6.6
P147	37.6	31.8	19.3	11.3
P148	65.3	16.4	13.1	5.1
P149	66.4	19.0	11.3	3.3
P150	60.6	18.2	15.3	5.8
P151	46.0	26.6	17.9	9.5
P152	59.5	21.5	14.2	4.7
P153	82.5	9.9	6.9	0.7
P154	80.7	8.8	8.0	2.6
P155R	16.8	34.3	27.4	21.5
P156	66.4	19.7	12.4	1.5
P157	46.0	27.0	19.7	7.3
P158	29.2	31.0	26.6	13.1
P159	69.0	19.7	9.9	1.5
P160	69.0	16.1	10.9	4.0
P161	37.6	28.5	25.9	8.0
P162	74.5	16.4	6.9	2.2
P163	50.4	21.9	18.6	9.1
P164R	12.0	24.5	39.8	23.7
P165	21.5	24.1	34.7	19.7
P166	82.5	12.0	4.7	0.7
P167	38.3	26.3	26.6	8.8
P168	34.7	28.1	21.2	16.1
P169	66.1	15.3	13.9	4.7
P170	63.1	22.3	12.0	2.6
P171	47.8	25.5	18.2	8.4
P172	60.2	20.1	15.7	4.0
P173	57.7	24.5	14.6	3.3
P174	24.1	24.1	31.0	20.8
P175	51.5	27.7	15.7	5.1
P176	29.6	31.0	25.5	13.9
P177R	22.6	21.5	33.6	22.3
P178	80.3	10.6	6.2	2.9
P179	27.4	25.2	32.8	14.6
P180	55.8	22.3	17.9	4.0
P181	40.5	26.6	21.5	11.3
P182	48.5	26.3	16.4	8.8
P183	70.8	19.7	7.3	2.2
P184	50.4	26.6	16.8	6.2
P185	60.9	19.3	16.8	2.9
P186	37.6	25.5	25.5	11.3
P187	68.6	18.2	10.2	2.9
P188	19.3	29.2	28.5	23.0
P189	42.0	32.1	17.9	8.0
P190	44.5	25.2	21.9	8.4
P191	44.5	25.5	19.7	10.2
P192	87.2	6.2	5.8	0.7
P193	43.8	21.9	19.7	14.6
P194	54.4	17.9	19.0	8.8
P195	69.7	19.0	9.5	1.8

P196	37.6	28.1	25.5	8.8
P197	75.9	13.9	8.0	2.2
P198	94.2	4.7	1.1	0.0
P199	35.4	35.8	16.8	12.0
P200	77.0	16.1	5.1	1.8
P201	70.1	15.0	9.9	5.1
P202	36.9	33.2	23.0	6.9
P203	63.9	23.4	8.0	4.7
P204	35.0	27.4	27.0	10.6
P205	57.3	19.0	17.5	6.2
P206	77.7	14.6	7.3	0.4
P207	75.9	14.6	6.6	2.9
P208	69.0	18.6	8.0	4.4
P209	59.5	19.0	13.5	8.0
P210R	74.8	19.7	4.4	1.1
P211	54.7	26.3	15.0	4.0
P212	41.6	21.9	22.6	13.9
P213	55.5	20.1	15.3	9.1
P214	56.2	26.3	11.3	6.2
P215R	32.1	27.7	27.0	13.1
P216	50.0	28.8	15.3	5.8
P217	77.7	13.9	6.6	1.8
P218	68.6	21.9	8.4	1.1
P219	85.4	10.9	3.3	0.4
P220	27.4	24.8	33.2	14.6

0 = Very false or often false; 1 = Sometimes or a little false; 2 = Sometimes or a little true; 3 = Very true or often true; R = Items with inverted scores already computed

Supplementary Material SM4: Indicators related to the two-dimension analysis of the PID-5 facets, in which unidimensionality was rejected – Online administration (N=274)

		Two-dimension				
Domain	**Facets**	**Factors**	**χ^2 (df)**	**TLI**	**RMSEA**	**RMSR**
NA	Emotional Lability	F1: P18. P62. P138. P181 F2: P102. 122. P165	8.40 (8)	0.999	0.012	0.01
NA	Anxiousness	F1: P79. P93. P95. 96. P130. P141. P174 F2: P109. P110	80.00 (19)	0.932	0.108	0.03
NA	Hostility	F1: P28. P38. P92. P158. P188 F2: P32. P85. P116. P170. P216	91.00 (26)	0.928	0.095	0.04
NA	Perseveration	F1: P60. P80. P121. P128. P137 F2: P46. P51. P78. P100	48.00 (19)	0.949	0.075	0.03
DET	Depressivity	F1: P27. P61. P66. P81. P86. P104. P148. P151. P163. P168. P169. P212 F2: P119. P178	456.00 (64)	0.880	0.150	0.03
DET	Suspiciousness	F1: P117. 131. P177. P190 F2: P2. P103. P13	22.00 (8)	0.931	0.079	0.04
DET	Manipulation	F1: P107. P125. P180 F2: P162. P219	29.00 (1)	0.630	0.320	0.03
DET	Deceitfulness	F1: P56. P76. P126. P134. P206. P218 F2: P41. P53. P142. P214	5392.00 (26)	-0.252	0.868	0.04
ANT	Grandiosity	F1: P40. P65. P114 F2: P179. P187. P197	7.80 (4)	0.974	0.059	0.02
ANT	Attention Seeking	F1: P111. P113. P173. P211 F2: P14. P43. P74. P191	44.00 (13)	0.958	0.093	0.02
ANT	Callousness	F1: P13. P19. P54. P72. P73. P153. P166. P183. P207. P208 F2: P198. P200	587.9 (64)	0.741	0.17	0.06
DIS	Irresponsibility	F1: P31. P156. P160. P171. P201. 210 F2: P129	22.00 (8)	0.942	0.078	0.03

DIS	Risk Taking	F1: P3. P39. P48. P67. P69. P98. P112. P159. P195	287.00 (64)	0.849	0.113	0.05
		F2: P7. P35. P87. P164. P215				
DIS	Rigid Perfectionism	F1: P105. P123. P135. P176	120.00 (26)	0.908	0.117	0.04
		F2: P34. P49. P115. P140. P196. P220				
PSY	Unusual Beliefs	F1: P99. 106. P139. P209	88.00 (13)	0.832	0.145	0.05
		F2: P94. P143. P150. P194				
PSY	Eccentricity	F1: P21. P24. P25. P55. P70. P172. P185	392.30 (53)	0.893	0.153	0.02
		F2: P5. P33. P52. P71. P152. P205				
PSY	Cognitive and Perceptual Dysregulation	F1: P36. P37. P44. P59. P77. P154. P192. P217	212.20 (43)	0.856	0.120	0.05
		F2: P42. P83. 193. P213				

ANT: Antagonism; df: Degrees of Freedom; DET: Detachment; DIS: Disinhibition; MI: Modification Index; NA: Negative Affect; PSY: Psychoticism; RMSEA: Root mean square error of approximation; RMSR = Root Mean Square Residual; TLI: Tucker-Lewis Index; X²= Chi-Square.