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Cross-cultural validation and standardization of the Impostor-Profile 30

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Abstract

The impostor phenomenon describes a maladaptive personality style marked by persistent self-doubt and fear of being exposed as a fraud despite evident success. Despite its global relevance, the construct's cross-cultural measurement invariance has not yet been empirically established. This study assessed the measurement invariance of the Impostor-Profile 30 across six European countries (N=2472; 60.0% female; M_{age} = 31.34, SD=13.36), and standardized the instrument by deriving normative values. Multi-group confirmatory factor analyses supported partial scalar invariance across five countries (excluding Italy; CFI=0.897, RMSEA=0.060, SRMR=0.090), strict invariance across genders (CFI=0.932, RMSEA=0.051, SRMR=0.057), and metric invariance across age groups (CFI=0.915, RMSEA=0.055, SRMR=0.070). Age-specific percentile ranks were derived to enable norm-based interpretation. These results confirm the cross-cultural equivalence of the IPP across five European countries, supporting its standardized use in psychological research and practice.

Keywords Cross-culture equivalence · Impostor phenomenon · Impostor-profile · Europe · Norm values.

Introduction

The Impostor Phenomenon (IP) is a psychological phenomenon characterized by the belief in illicitly obtained achievements, leading to feelings of self-doubt, anxiety, and low efficacy (Clance, 1985). It is commonly experienced by individuals who excel in their fields yet struggle with a persistent sense of fraudulence. Like Ms. Sandberg, former chief operating officer of Facebook, Harvard graduate, and multiple-time Forbes top 50 most powerful businesswomen, described in her book her own impostor experiences:

> "Every time I was called on in class, I was sure that I was about to embarrass myself. Every time I took a test, I was sure that I had had gone badly. And every time I didn´t embarrass myself–or even excelled–I believed that I had fooled everyone yet again. One day soon, the jig would be up." (Sandberg, 2013, p. 28).

As Ms. Sandberg vividly illustrated, the IP describes a maladaptive self-concept in successful individuals who, despite objective indicators of competence, perceive themselves as overachievers (Clance & Imes, 1978), and consider positive

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feedback as unjustified, leading to a feeling of perceived fraudulence (Kolligian & Sternberg, 1991). The divergence between a low belief in one's intellectual competence and high perceived external expectations causes individuals to feel like impostors (Clance, 1985). Clance first observed the IP in high-achieving women (Clance & Imes, 1978), whereby the subsequent research indicated both genders being affected without a substantial difference in prevalence (Cokley et al., 2015). Beyond the many celebrity accounts of their IP experiences in the media, the construct gains individual and societal relevance due to health and professional implications. The IP is associated with health and well-being, predicting depression, anxiety disorders, and sandbagging (Bravata et al., 2020). Further, due to their maladaptive self-image, those affected impede themselves by avoiding management promotions, fearing the resulting salience of their incompetence (Neureiter & Traut-Mattausch, 2016).

Therefore, a deeper understanding of the IP could help increase well-being and treat symptoms of depression and anxiety more efficiently and help those affected to pursue their professional goals globally, as the IP is not solely considered a Western phenomenon.

However, the influence of culture or the assumption of cultural independence has not been empirically examined yet. Despite the international relevance of the IP research, there has not been, to our knowledge, any investigation into cross-cultural equivalence, even among Western nations in Europe. The lack of cross-cultural validity as a prerequisite for internationally tested constructs is typical of many psychological constructs (Borsboom, 2006). The lack of validation may result in items and entire scales being interpreted differently in various languages and cultures (Fischer et al., 2023), leading to biased generalizations of conclusions, and limited international transferability of knowledge about specific IP treatments. Thus, the unanswered question of whether the IP exhibits cross-cultural equivalence is crucial for contextualizing existing and future research results.

In addition to cross-cultural validity, another significant and highly debated area in IP research addresses the valid measurement of the construct. Despite the development of multiple instruments, no gold standard has been established (Mak et al., 2019). The Clance Impostor Phenomenon Scale (CIPS; Clance, 1985) is the most widely used and well-validated instrument, demonstrating good reliability and content validity (Brauer & Wolf, 2016; Bravata et al., 2020). However, Mak et al. (2019) highlight in their systematic review that the CIPS, initially constructed unidimensionally, does not comprehensively capture the IP′s multidimensional nature. The IP is considered a multidimensional construct with six core elements (the impostor cycle; the need to be special, the very best; superwoman/superman aspects; fair of failure; denial of competence and discounting praise; fear or guilt about success; Sakulku, 2011), though not all core elements need to be pronounced for someone to be classified as an impostor. Therefore, nuanced diagnostics are essential to adequately capture the multidimensionality of the construct.

To address this construct-measurement incongruence, the Impostor-Profile 30 (IPP; Ibrahim et al., 2022a) was developed as a multidimensional questionnaire measuring the overall impostor expression and IP-inherent facets through subscales. Following its development, validation studies supported convergent and discriminant validity (Ibrahim et al., 2021, 2022b). However, the examination of cross-cultural validity and standardization of the instrument has not been conducted yet. Therefore, the main research objective of this study is to investigate whether IP exhibits cross-cultural validity by examining the measurement equivalence of the IPP across six European countries. We examined the English, Romanian, Italian, Czech, Russian, and German versions of the IPP. Additionally, with the scalar measurement invariance as a prerequisite, we intend to standardize the instrument and derive norm values.

To address these gaps, the present study investigates the cross-cultural equivalence and standardization of the Impostor-Profile 30 (IPP) across six European countries: the United Kingdom, Germany, Czechia, Italy, Romania, and Russia. These countries were selected to capture a wide spectrum of European cultural dimensions and linguistic roots. Linguistically, the selection includes representatives of the Germanic (English, German), Slavic (Czech, Russian), and Romance (Italian, Romanian) language families. Culturally and psychologically, the countries differ significantly in terms of individualism to collectivism, power distance, uncertainty avoidance, and performance orientation, as established in cross-cultural psychology (e.g., Hofstede, 2013; Realo & Allik, 1999). These dimensions are particularly relevant for the expression and interpretation of impostor-related thoughts and behaviors, which are deeply embedded in social comparison, achievement orientation, and interpersonal sensitivity.

For instance, more individualistic countries (e.g., the UK, Italy) may emphasize personal success and self-promotion, potentially intensifying impostor feelings through heightened internal performance standards. In contrast, more collectivistic nations (e.g., Russia, Romania) may buffer such feelings through greater external attribution and social support, or conversely exacerbate them due to stronger group comparison pressures. These cultural contrasts justify the selection of the six countries and allow for meaningful examination of the IPP's cross-cultural applicability.

Based on previous findings and the theoretical framework of measurement invariance, we formulated the following hypotheses:

H1a, B, C Across different language versions, the Impostor-Profile demonstrates structural, metric, and scalar equivalence.

H2a, B, C Across genders, the Impostor-Profile demonstrates structural, metric, and scalar equivalence.

H3a, B, C Across age groups, the Impostor-Profile demonstrates structural, metric, and scalar equivalence.

By examining these hypotheses, the study aims to establish the psychometric equivalence of the IPP across culturally diverse populations, thereby enabling valid international use and interpretation of the instrument.

Theoretical background

Gender, cross-culture equivalence, and psychometric potential

The IP was initially formulated by Clance (1985) and describes individuals who perceive their own successes as undeserved and fear being exposed as impostors due to failure. According to Sakulku (2011), the construct involves six key elements. First, the Impostor Cycle, which describes a pattern of pre- or procrastination followed by excessive work. This cycle often leads to the external attribution of success and reinforces the individual's working style. Second, the Need to Be Special, which reflects a strong ambition and personal standard to be the very best among one's peers, driven by a desire for exceptionalism. Third, the Superwoman/Superman Aspects, characterized by the belief that true success should come effortlessly. Fourth, Fear of Failure, an intense anxiety triggered in achievement-related tasks, where individuals fear exposing their perceived incompetence.

Fifth, Denial of Competence and Discounting Praise, where individuals attribute their success to external factors such as luck or the goodwill of others, while struggling to internalize achievements, undermining their self-efficacy. Finally, Fear and Guilt About Success, where individuals worry that their achievements might lead to rejection or alienation from others, as they often feel they do not truly belong. Together, these elements highlight the multidimensional nature of the impostor phenomenon, encompassing cognitive, emotional, and behavioral dimensions.

The IPP comprises six scales that capture the different facets of the impostor phenomenon: Competence Doubt (fear of failure, maladaptive perfectionism, self-doubt), Working Style (pre- and procrastination), Alienation (impression management), Other-Self Divergence (denial of competence and discounting praise), Ambition (the drive to be the very best), and Need for Sympathy (external attribution of success to the goodwill of others; Ibrahim et al., 2021).

Originally, the IP was thought to mainly impact women in professional settings, as identified by Clance and Imes (1978). The question of gender influence on the IP remains an unresolved debate. The systematic review by Bravata et al. (2020) revealed that out of 33 articles, 16 identified a higher manifestation in women, while 17 found no gender differences. Overall, women tend to exhibit higher levels of IP feelings, with Hutchins and Rainbolt (2017) explaining that men and women handle the IP differently. Ibrahim et al. (2021) supported this assumption with the IPP by showing that the overall manifestation differs only slightly between genders but becomes more apparent at the subscale level. Women tend to exhibit higher levels of competence doubt and need for sympathy, while men display greater ambition, driven by a need to be exceptional and compensating for self-doubt through performance and external markers of success. Furthermore, variations in gender equality across nations and cultures significantly influence gender-specific prevalences of subclinical phenomena, such as the impostor phenomenon, and overall well-being (Tesch-Römer et al., 2008). To accurately compare findings across cultural groups and generalize results, particularly regarding gender differences, it is crucial to examine measurement invariance to ensure consistent interpretation of the construct across different cultural contexts (Fischer & Karl, 2019).

The most widely used and well-validated instrument for measuring the IP, the English Clance Impostor Phenomenon Scale (CIPS; Clance, 1985), has been translated and validated in numerous languages (e.g., Kay & Brauer, 2016; Yaffe, 2020; Chae et al., 1995). To date, neither the CIPS nor any other instrument for measuring the IP has been cross-culturally validated, maintaining the cultural equivalence of the IP as an open research question. In addition to the CIPS's cross-cultural validity, the questionnaire's structure is also a highly researched but still unanswered research gap, as there is no consensus regarding the instrument's factor structure (Brauer & Wolf, 2016; Yaffe, 2020).

As Mak et al. (2019) described, the multidimensionality of the IP is not operationalized psychometrically in existing instruments like the unidimensional CIPS. They conclude: "*Despite being based on multidimensional definitions of the construct*, *these measures calculate overall total scores and do not define subscale scores. Scoring of these measures*

appears to contradict the theoretical conceptualization of the impostor phenomenon."

To address the IP´s multidimensional nature, the IPP (Ibrahim et al., 2022a) was developed as a questionnaire measuring the total impostor expression as well as the core elements formulated by Clance (1985) through subscales. The validity of the IPP was demonstrated by a strong positive correlation with the CIPS, self-esteem, and neuroticism (Ibrahim et al., 2022a). Additionally, the subscale competence doubt was strongly related with the internal attribution in negative situations, alienation correlated strongly with situational variability, and other-self divergence was highly associated with the concern for appropriateness (Ibrahim et al., 2021). Moreover, learned helplessness, defensive pessimism, and a fixed mindset were positively related to the IPP total score (Ibrahim et al., 2022a).

Confirmatory validation of the IPP's factor structure, involving the comparison of a six-correlated factor model, a one-factor model, a hierarchical model with one second-order and six first-order factors, and a bifactor model with one bifactor and six group factors, identified the bifactor model as the best-fitting in both the English, German and Swedish versions (Ibrahim et al., 2021, 2022b; Doshi et al., 2024), allowing for the examination of general and group factor invariance (Reise et al., 2010).

The external validity of the instrument was supported by an experimental design in which participants completed a bogus intelligence test and received either positive or negative feedback. Individuals with higher overall IPP scores demonstrated an internal-stable attribution for failure and an external-unstable attribution for success (Ibrahim et al., 2022c). Further, examination of the IPP´s other-version indicated a less accurate judge´s assessment with a higher IP expression of the target (Ibrahim et al., 2023).

Nevertheless, the instrument has only been validated in English and German and has not been normed, significantly limiting its practical use. Furthermore, establishing cross-cultural equivalence is imperative for the robust application of the IPP within Europe and, in a further step, globally. Further, cross-cultural validation of the IPP within the European cultural sphere would be a crucial first step in confirming the construct's cultural equivalence and supporting the cultural independence of existing findings in Western cultures.

Nomological network and cross-cultural prevalence

Findings regarding the nomological network and convergent validities of the IP are predominantly derived from Western samples. However, the construct is not considered a culture-specific phenomenon and is studied globally. For example, high prevalence of the IP using the translated CIPS was demonstrated in a Korean sample (Chae et al., 1995), while the prevalence was significantly lower compared to American samples. The absence of cross-cultural equivalence impedes interpreting the prevalence differences, as they may also be related to item or construct bias (Van de Vijver & Tanzer, 2004). Chae et al. (1995) showed that the IP is positively associated with neuroticism and negatively with agreeableness, conscientiousness, and extraversion. This pattern of associations was replicated within a Russian sample (Sheveleva et al., 2023) and a Belgian sample using the CIPS after excluding four items (Vergauwe et al., 2015). However, in an American study, extraversion and agreeableness were not associated with the CIPS (Bernard et al., 2002), with openness exhibiting a positive correlation. These differences could indicate existing cultural disparities or a potential lack of cross-cultural validity of the CIPS, given that both Chae et al. (1995) and Bernard et al. (2002) used the same comparative instrument, the NEO-PI-R (Costa & McCrae, 1992). Thus, for a deeper understanding of the construct, it is crucial to examine cross-cultural equivalence, which allows for the generalization of the nomological network and facilitates the contextualization of previous cross-cultural findings.

In addition to the Big Five, the IP exhibits clear correlations with anxiety (Bernard et al., 2002), primarily from the anticipation of failure and the fear of being exposed as an impostor by revealing incompetence. Additionally, self-esteem and self-efficacy (Vergauwe et al., 2015) appear as constructs associated with the IP across different cultures.

Examining predictors of the IP underscores its relevance in the realm of mental health, indicated by positive associations with burnout and depression (Cokley et al., 2013). Particularly in highly competitive and performance-oriented fields such as medicine, there is an increased prevalence of burnout, distress, depressive symptoms, and impostor feelings (Brennan-Wydra et al., 2021). Chakraverty (2020) identified, through semi-structured interviews, that in students of a demanding combined training program (MD-PhD), professional identity formation served as a primary cause of IP feelings.

Among students, a high impostor expression is particularly prevalent, and Bernard et al. (2018) demonstrated in a longitudinal study that minority groups are even more receptive to impostor feelings, with impostorism proving to be a stronger predictor of mental health than minority status stress (Cokley et al., 2013). The IP can be described as an overall maladaptive personality style (Ross & Krukowski, 2003), negatively associated with satisfaction, self-worth, confidence in leadership roles, and performance outcome expectations, representing a relevant construct in numerous performance-oriented subpopulations (Neureiter & Traut-Mattausch, 2016; Vergauwe et al., 2015).

The high prevalence, as well as the associations with performance- and well-being-reducing constructs, underscore the IP´s societal relevance. In an increasingly globalized world with international organizations, the cross-cultural equivalence of the construct, as well as a highly valid and fine-grained measurement, appear as important preconditions for future international research and practice. A step towards increased congruence regarding the multidimensionality of the theoretical construct and the instrument was taken through the development of the IPP. Nevertheless, the cross-cultural equivalence of the construct remains an unanswered research gap, and the normalization of the IPP is a necessary currently open requirement for interpreting IPP scores validly.

The present study

In this study, we aim to examine the IP´s European cross-cultural equivalence through investigating the IPP´s invariance over six nations. Further, we examine invariance between genders and age groups. Additionally, when meeting the requirements of partial scalar invariance, the total sample is used to standardize the IPP and, for the first time, derive norm values facilitating the interpretation of the impostor expressions in relation to the population.

Method

Participants and procedure

The survey was conducted online from February to December 2023. Participants were recruited through a combination of online and offline university bulletin boards, social media platforms (Facebook; LinkedIn), and email invitations distributed via professional and academic networks. Furthermore, the English sample was recruited via the commercial panel MTurk, with participants receiving a compensation of $2.50. The convenience and snowball sampling approach may have introduced selection bias, as the sample primarily consisted of individuals with access to these communication channels, potentially overrepresenting individuals from academic and urban environments. The English sample, which included participants recruited via the commercial panel MTurk, may be subject to biases such as non-naivety, satisficing, and limited demographic representativeness.To partially mitigate these biases, we ensured a diverse age range (18–79 years), included six countries with distinct cultural and linguistic profiles, and applied native-language versions of the survey. Furthermore, the recruitment material was distributed via multiple channels (online and offline) to reach individuals beyond exclusively academic populations. While not eliminating bias, this approach aimed to increase heterogeneity within the constraints of voluntary participation. Limitations due to this strategy are acknowledged and discussed in detail in the limitations section. Participants received credit hours as compensation for their participation. Inclusion criteria required participants to complete the survey, provide informed consent, and have proficiency in one of the six examined languages as their native language. The online surveys were conducted in German, English, Czech, and Russian using the platform form{`r} (Arslan et al., 2020). The Italian and Romanian surveys were conducted using the Google Forms platform. The pseudonymized online survey included demographic questions as well as the IPP in the respective translation. On average, the survey took 8 min and 31 s to complete. The instrument was translated from English into Russian, Czech, Romanian, and Italian by a native speaker of each respective language and subsequently back-translated into English by a second native speaker using the back-and-forth translation method. The two English versions were then compared and adjusted for consistency (Brislin, 1970). The original and back-translated English versions were compared to identify semantic inconsistencies and culturally inappropriate phrasings. Minor adjustments were made to ensure conceptual equivalence across all language versions. For instance, item 10 (“I think it is important to appear sympathetic”) was slightly adapted in the Russian version, as the concept of “appearing sympathetic” does not translate directly. It was therefore rendered as “Я думаю, что важно выражать сочувствие” (“I think it is important to express compassion”) to preserve the intended meaning. Similarly, in the Czech version, linguistic clarity was improved by using “harder” instead of “difficult” in item 2 (“Mnoho věcí si ztěžuji odkládáním své práce”; “I make many things harder for myself by postponing my work”). In the Italian version, item 22 was reworded during the back-translation process to enhance clarity; “little authentic” was replaced with “not sincere” (“Spesso agisco in modo non sincero”; “I often act in a way that is not sincere”).

The ethical acceptability of the study was discussed with the Chair of the Ethics Committee of the Helmut-Schmidt-University. It was determined that a full ethics application was not required, as the study was conducted in a pseudonymized format, with all identifying information removed upon completion through the deletion of participant codes, thereby ensuring full anonymization. Therefore, no ethics approval number was issued. The study adhered to the ethical principles outlined in the Declaration of Helsinki. All participants provided informed consent for data processing and voluntarily participated in the study. After removing outliers, the total dataset comprised 2472 individuals (60.0% female) between 18 and 79 years (M_{age} = 31.34, SD_{age} = 13.36). The

descriptive statistics of the total dataset and the sub-datasets are presented in the supplements (Table 1A).

The rationale for the sample selection was to first examine cross-cultural equivalence within European cultural spheres. To capture the diversity of European languages and cultures, six nations with distinct linguistic roots were selected. Italian and Romanian are derived from Latin, German and English from Proto-Germanic roots, and Czech and Russian from Slavic languages (Gamkrelidze & Ivanov, 1990). Beyond linguistic diversity, these countries also exhibit significant cultural and psychological differences that may influence the interpretation of IPP items. For instance, variations in individualism versus collectivism, power distance, and attitudes toward success and failure, as highlighted in cross-cultural psychology (Hofstede, 2013), are relevant. According to Hofstede's scores (Ilieș & Zahid, 2019), this study includes highly individualistic cultures (Italy =76; UK =89), moderately individualistic cultures (Czech Republic =58; Germany =67), and collectivistic cultures (Romania =30). Similarly, Realo and Allik (1999) note that Russia demonstrates also collectivistic tendencies. Therefore, this cultural diversity allows for a generalized assessment of the IPP psychometric properties across diverse cultural dimensions.

The Impostor-Profile 30

The Impostor Profile 30 (IPP; Ibrahim et al., 2021) consists of 30 items, forming six subscales and the IPP total score. The items are measured on a 10-point Likert scale ranging from 1 (Not like me at all) to 10 (Very much like me). The scales demonstrate good internal consistency ($\alpha = 0.94 - 0.72$; Ibrahim et al., 2022c), with the Need for Sympathy scale showing low reliability ($\alpha = 0.67$; Ibrahim et al., 2021).

Data analysis

For the data analysis, we utilized the R software (R Core Team, 2023) and the package lavaan (Rosseel et al., 2017). Only complete datasets were included in the analysis. Cases with missing values on any of the relevant variables were excluded listwise. This approach was chosen to ensure unbiased parameter estimation in confirmatory factor analysis, as the robust maximum likelihood estimator (MLR) does not impute missing values by default. To identify and subsequently remove outliers, we defined the Mahalanobis distance, and a threshold of $p < .001$ was set to evaluate statistically significant deviations from the data centroid. After removing outliers ($n = 123$), the remaining data were used to assess the reliability of the IPP total score and subscales across the different languages. Prior to verifying the factor structure of the IPP through CFAs, the internal consistency of the overall scale was assessed as a preliminary check to ensure acceptable psychometric properties across the samples regarding the suitability of the dataset for subsequent structural analyses. Following the recommendation of Gäde et al. (2020), we calculated Cronbach's alpha as well as Guttman's Lambda- 6 as a complementary measure. Lambda- 6 is particularly useful in cases of unequal item loadings and smaller scales. For both indicators, values of ≥ 0.70 are acceptable, ≥ 0.80 indicate good reliability, and ≥ 0.90 suggest excellent reliability (Nunnally & Bernstein, 1994).

After reliability testing, we examined the invariance of the IPP across six countries. Measurement invariance (MI) of the IPP was evaluated using multi-group confirmatory factor analysis (MG-CFA). A three-step procedure was employed to test increasingly restrictive forms of invariance: configural (same factor structure), metric (equal factor loadings), and scalar invariance (equal factor loadings and item intercepts). These steps are essential for establishing structural comparability and enabling valid comparisons of latent means across groups. Model fit was assessed using the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR), based on recommended thresholds (CFI ≥ 0.90; RMSEA ≤ 0.08; SRMR ≤ 0.08; Hu & Bentler, 1999; Browne & Cudeck, 1992).

Invariance decisions were based on changes in fit indices following the guidelines by Chen (2007), whereby a decline of ΔCFI ≥ 0.010, ΔRMSEA ≥ 0.015, or ΔSRMR ≥ 0.030 (or ≥ 0.010 for scalar invariance) indicated meaningful deterioration in model fit. In cases where full metric or scalar invariance could not be established, modification indices were inspected to determine whether partial invariance could be achieved by releasing specific parameter constraints in a theoretically grounded manner (Borsboom, 2006).

To determine the best-fitting structural model of the IPP, four alternative confirmatory factor analysis (CFA) models were evaluated: (1) a six-factor correlated model, (2) a unidimensional model, (3) a hierarchical model, and (4) a bifactor model. This approach follows both theoretical and empirical considerations outlined in Ibrahim et al. (2021, 2022b). The six-factor correlated model reflects the assumption that the six IP facets are distinct but interrelated components of the phenomenon. The unidimensional model, in contrast, assumes a general underlying impostor trait. Although this approach is conceptually less aligned with the IPP's multidimensional construct formulation, it reflects the predominant measurement rationale used in established instruments such as the CIPS. The hierarchical model incorporates a second-order impostor factor that influences the six subscales, thereby assuming a nested structure. Finally, the

bifactor model specifies that each item loads on both a general impostor factor and one of six group factors. This model allows for simultaneous estimation of general and specific dimensions and is well aligned with the theoretical premise that the impostor phenomenon encompasses both a global disposition and differentiated subcomponents (Sakulku, 2011; Ibrahim et al., 2021). Across all countries, the bifactor model showed the best model fit and was therefore retained for all further measurement invariance tests. In addition to superior empirical fit indices, the bifactor model provides a nuanced account of shared and unique variance and supports the IPP's intended multidimensional structure.

Transparency and openness

This study has been pre-registered. All data, the R-script and pre-registration are available at: https://osf.io/2ab5y/.

Results

Sample description

The initial dataset comprises $N = 2595$ respondents from six countries: $n = 479$ from the United Kingdom, $n = 302$ from Romania, $n = 367$ from Italy, $n = 612$ from Germany, $n = 502$ from the Czech Republic and $n = 333$ from Russia. Of the total sample, 123 observations ($n = 123$ from England) showed Mahalanobis distances that significantly deviated from the data centroid and were subsequently removed. The elevated number of outliers in the English sample can be attributed to the use of a commercial survey panel. Table 1A in the supplements presents the remaining sample sizes by country, and Fig. 1A provides a detailed overview of the participant flow.

The reliability of measurement for each country, along with the corresponding adequacy tests, are presented in Table 1. The last row of the table presents the characteristics of the overall data. The Cronbach's Alpha and the G6 reliability index are higher than the recommended threshold of 0.7 in all cases. Bartlett's test of sphericity ($p < .001$) confirmed the suitability of the data for factor analysis across all cases. This was further supported by the Kaiser-Meyer-Olkin (KMO) statistic for factor adequacy, which ranged from 0.87 to 0.95, exceeding the recommended threshold of 0.85.

Table 1 The reliability and factor adequacy measures for each country and for the overall sample

Country	Cronbach's Alpha	G6 (smc)	Barlett´s test	KMO
Czechia	0.87	0.91	$X^2 = 5985.96^{***}$	0.87
United kingdom	0.95	0.96	$X^2 = 7547.15^{***}$	0.95
Germany	0.92	0.95	$X^2 = 9982.11^{***}$	0.93
Italy	0.90	0.93	$X^2 = 4810.52^{***}$	0.90
Romania	0.91	0.94	$X^2 = 4441.79^{***}$	0.91
Russia	0.92	0.94	$X^2 = 5251.86^{***}$	0.92
Overall sample	0.93	0.95	$X^2 = 38351.55^{***}$	0.95

KMO as Kaiser-Meyer-Olkin statistic for factor adequacy; Barlett´s test of sphericity; $^{***}p < .001$

Confirmatory factor analysis in the different countries

Before conducting the MG-CFA to test MI, we performed a single-group CFA for each country to compare the four models. The bifactor model was selected as the best-fitting model for all countries based on its superior fit indices (CFI, TLI, RMSEA, SRMR) compared to the unidimensional, correlated six-factor, and hierarchical model. The bifactorial model showed the best fit in all countries (see Table 2), with Italy exhibiting the poorest fit (CFI = 0.896; TLI = 0.879; RMSEA = 0.058; SRMR = 0.061). Furthermore, we tested the bifactorial model with the overall dataset. The model exhibited a good fit (CFI = 0.949; TLI = 0.932; RMSEA = 0.046; SRMR = 0.047). In addition to its empirical advantage, the bifactor model aligns well with the multidimensional structure of the IPP, capturing both a general impostor construct (general factor) and specific facets (group factors). This theoretical alignment further supports the construct validity of the IPP and underscores its appropriateness for cross-cultural comparisons.

Measurement invariance between the different countries

We conducted an MG-CFA to test MI using the six countries as the grouping variable (Table 3). Examining configural MI (equal structure across countries) showed a sufficient model fit (CFI = 0.918; RMSEA = 0.056; SRMR = 0.060; H1a). Testing metric invariance (equal factor loadings across groups) worsened the model fit, indicating a violation of the model fit criteria (ΔCFI = 0.021; ΔRMSEA = 0.004; ΔSRMR = 0.031). To enhance model fit, we employed a theory-driven approach by consulting modification indices, which suggest parameters whose freeing could meaningfully improve model fit without compromising theoretical coherence (Byrne, 2012). We identified and released error covariances for four item pairs that shared semantically overlapping content: item 2 and item 5 (both addressing "abilities"), item 1 and item 9 (referring to "fear" and "being afraid"), item 12 and item 13 (both including the term "postpone"), and item 12 and item 14 (both beginning with "I"). These adjustments align with prior validation studies of the

Table 2 Comparison of confirmatory factor analysis model fit across countries

	M1	M2	M3	M4
	CFI			
Czechia	0.868	0.477	0.860	0.902
England	0.855	0.734	0.847	0.898
Germany	0.934	0.660	0.928	0.952
Italy	0.834	0.641	0.826	0.896
Romania	0.904	0.674	0.887	0.909
Russia	0.896	0.664	0.872	0.930
	TLI			
Czechia	0.853	0.438	0.848	0.886
England	0.839	0.714	0.834	0.882
Germany	0.926	0.634	0.922	0.944
Italy	0.815	0.614	0.811	0.879
Romania	0.893	0.650	0.877	0.894
Russia	0.884	0.639	0.860	0.918
	RMSEA			
Czechia	0.062	0.115	0.063	0.054
England	0.087	0.116	0.088	0.074
Germany	0.052	0.115	0.053	0.043
Italy	0.069	0.104	0.073	0.058
Romania	0.058	0.105	0.062	0.058
Russia	0.063	0.111	0.069	0.053
	SRMR			
Czechia	0.071	0.120	0.076	0.061
England	0.112	0.101	0.104	0.080
Germany	0.068	0.101	0.073	0.050
Italy	0.088	0.095	0.091	0.061
Romania	0.071	0.099	0.081	0.070
Russia	0.103	0.096	0.111	0.061

M1: Six correlating factors; M2: One factor model; M3: One second-order and six first-order factors; M4: One bifactor and six groupfactors; We used the robust fit indices for model evaluation; CFI ≥0.90, RMSEA ≤0.08, and SRMR ≤0.08 are considered acceptable thresholds for model fit (Hu & Bentler, 1999)

Table 3 Model fit indices and Δ criteria for measurement invariance testing across countries (MG-CFA)

		χ2 (df)	CFI	RMSEA	SRMR
Model 1:	Configural invariance	5427.875 (2250)	0.918	0.056	0.060
Model 2:	Metric invariance	6504.425 (2509)	0.897	0.060	0.091
Model 2_a:	Metric invariance[a]	6100.860 (2485)	0.907	0.057	0.089
Model 3:	Scalar invariance[a]	7940.539 (2600)	0.860	0.069	0.096
Model 4:	Partial scalar invariance	7004.198 (2560)	0.885	0.063	0.092
Model $4_{5\ samples}$:	Partial scalar invariance*	5619.904 (2122)	0.897	0.060	0.090
Model comparisons		Δχ2 (Δdf)	ΔCFI	ΔRMSEA	ΔSRMR
M2 - M1		1076.55 (259)	0.021	0.004	0.031
$M2_a$ - M1		672.985 (235)	0.011	< 0.001	0.029
M3 - $M2_a$		1839.679 (115)	0.047	0.012	0.007
M4 - $M2_a$		903.228 (115)	0.022	0.006	0.003
$M4_{5\ samples}$ - $M2_a$		480.956 (363)	0.010	0.003	0.001

[a]four released covariances between item 2 and 5; 1 and 9; 12 and 13; 12 and 14; Model 4 = regression coefficient is constrained to be equal across groups in item 1,2,4,5,13,18,25,26,30; *This sample includes the German, English, Rumanian, Czech, and Russian IPP version; Model 1 = congruent invariance (same structure across countries); Model 2 = metric invariance (some structure and factor loadings across countries); M3 = scalar invariance (same structure, loadings and intercepts across countries); M4 = partial scalar invariance (partial invariance with released parameter constraints between groups); metric or scalar invariance was rejected when ΔCFI ≥0.010; ΔRMSEA ≥0.015; and ΔSRMR ≥0.030, or ≥0.010 for scalar invariance (Chen, 2007)

IPP (Ibrahim et al., 2021, 2022b) and resulted in a notably improved model fit. Testing metric invariance with the adjusted model showed an acceptable difference in model fit (ΔCFI = 0.011; ΔRMSEA < 0.001; ΔSRMR = 0.029; H1b). Subsequently, scalar MI (equal factor loadings and intercepts) was tested.

The scalar invariance model partially fulfilled the fit criteria, with acceptable differences in RMSEA (ΔRMSEA = 0.012) and SRMR (ΔSRMR = 0.007), but exceeded the recommended threshold for ΔCFI (ΔCFI = 0.047). To address this, partial scalar measurement invariance was tested by allowing several intercepts to vary freely across countries as a standard approach in cross-cultural comparisons of latent constructs (Dong & Dumas, 2020).

Specifically, the intercepts of the following IPP items were relaxed due to partially overlapping content or similar phrasing across translations: Items 1, 4, and 12 (include "fear of failure" and "work"); Items 2 and 5 (referring to "my capabilities" or "my skills"); Items 5 and 20 (beginning with "I am"); and Items 25 and 28 (both containing the phrase "important to"). This adjustment yielded improved model fit values for RMSEA (ΔRMSEA = 0.006) and SRMR (ΔSRMR = 0.003); however, ΔCFI remained above the recommended cut-off (ΔCFI = 0.022), preventing full acceptance of partial scalar invariance across all six countries. Further item-level inspection and model diagnostics revealed that the Italian sample exhibited systematically poorer fit in both single-group and multi-group CFA models. Within the Italian sample, the bifactor model showed the lowest overall fit among all countries (CFI = 0.896, TLI = 0.879, RMSEA = 0.058, SRMR = 0.061). Additionally, descriptive analyses indicated distinct response tendencies, including consistently lower mean scores and elevated skewness across several subscales (see Supplementary Table 1 A). These deviations suggest that cultural or linguistic

Table 4 Model fit indices and Δ criteria for measurement invariance testing (MG-CFA) between genders and age groups

		Genders				Age groups			
		χ2 (df)	CFI	RMSEA	SRMR	χ2 (df)	CFI	RMSEA	SRMR
Model 1:	Configural invariance	2999.371 (750)	0.936	0.052	0.051	4137.466 (1500)	0.921	0.056	0.059
Model 2:	Metric invariance	3084.150 (803)	0.936	0.051	0.056	4518,809 (1659)	0.915	0.055	0.070
Model 3:	Scalar invariance	3195.771 (826)	0.933	0.051	0.056	4920.585 (1728)	0.904	0.057	0.074
Model 4:	Strict invariance	3262.326 (856)	0.932	0.051	0.057	5371.201 (1818)	0.894	0.059	0.076
Model comparisons		Δχ2 (Δdf)	ΔCFI	ΔRMSEA	ΔSRMR	Δχ2 (Δdf)	ΔCFI	ΔRMSEA	ΔSRMR
M2 - M1		84,779 (53)	< 0.001	0.001	0.005	84,779 (53)	0.006	0.001	0.011
M3 - M2		111.621 (23)	0.003	< 0.001	< 0.001	111.621 (23)	0.011	0.002	0.004
M4 - M3		66.555 (30)	0.001	< 0.001	0.001	66.555 (30)	0.010	0.002	0.002

differences may have influenced the item interpretation in the Italian context.

To evaluate the impact of this deviation, the invariance analysis was repeated with the Italian sample excluded. The resulting partial scalar invariance model demonstrated improved fit: CFI = 0.897, RMSEA = 0.060, SRMR = 0.090, with model differences within acceptable limits (ΔCFI = 0.010; ΔRMSEA = 0.003; ΔSRMR = 0.001), satisfying the threshold criteria for partial scalar invariance (Chen, 2007). Given the consistent pattern of misfit in the Italian data and the improved model performance upon its exclusion, the Italian sample was omitted from further invariance analyses.

Consequently, partial scalar invariance was supported across five national groups: Germany, the United Kingdom, Czechia, Romania and Russia, enabling the derivation of unified normative values for these populations.

Measurement invariance between genders and age groups

We conducted a MF-CFA excluding the Italian sample to investigate MI between male and female genders (Table 4). Examination of configural MI revealed adequate model fit (CFI = 0.936; RMSEA = 0.052; SRMR = 0.051; H2a). Evaluation of metric MI indicated an acceptable model decline (ΔCFI < 0.001; ΔRMSEA = 0.001; ΔSRMR = 0.005; H2b). Additionally, scalar measurement invariance was tested by imposing constraints on factor loadings and intercepts across male and female groups. Although this introduced a small degradation in model fit (ΔCFI = 0.003; ΔRMSEA < 0.001; ΔSRMR < 0.001; H2c), the changes remained within acceptable thresholds, indicating that the IPP items were interpreted similarly across genders.

Testing for strict MI (constrained loadings, intercepts, and residuals) also resulted in an acceptable model degradation (ΔCFI = 0.001; ΔRMSEA < 0.001; ΔSRMR = 0.031), indicating strict MI between male and female genders (H2c). These findings remained within acceptable thresholds (Chen, 2007; Table 4), supporting the conclusion that the IPP items are interpreted similarly by men and women. Importantly, no modification indices indicated substantial misfit for individual items, and no parameters had to be freed to achieve strict invariance. This supports the theoretical assumption that the IPP's multidimensional structure captures core elements of the impostor phenomenon in a gender-invariant way. This finding is also in line with prior research indicating largely similar IP expression across genders, with only subtle differences at the facet level (Ibrahim et al., 2021), further supporting the appropriateness of the IPP for cross-gender comparisons without the need for scale adaptation.

Furthermore, we examined MI across four age groups (18 to 30; 31 to 40 years; 41 to 50; and over 50 years; Table 3). Configural MI examination yielded satisfactory fit indices (CFI = 0.921; RMSEA = 0.056; SRMR = 0.059; H3a). Metric invariance examination showed a low model degradation (ΔCFI = 0.006; ΔRMSEA = 0.001; ΔSRMR = 0.011), supporting metric MI across age groups (H2b). Scalar MI examination slightly exceeded the threshold according to Chen (2007) in CFI (ΔCFI = 0.011), while RMSEA and SRMR (ΔRMSEA < 0.002; ΔSRMR < 0.004) met the criteria. Due to the slight CFI deviation, scalar measurement invariance cannot be assumed across age groups and hypothesis 3c was rejected.

The change in model fit (Table 4) indicates strict invariance for genders and metric MI for age groups. Hence, cross-gender but age-specific normative values are derived for the Czech, English, German, Romanian, and Russian versions of the IPP. Shapiro-Wilk tests for normal distribution indicated the IPP total score and subscales do not exhibit a normal distribution (all scales < 0.001). Despite the non-normal distribution, percentile ranks for the four age groups were derived (Tables 4, 5, 6 and 7 A) using the empirical cumulative distribution function (ECDF) applied to the normalized data, ensuring practical applicability and interpretability of the IPP scores (Woerner et al., 2017a, b).

For each age group, we applied the empirical cumulative distribution function (ECDF) to the normalized data, which represents the proportion of scores below or equal to a given value, and calculated the respective quantiles (see supplements R-script for more detail).

Discussion

This study aimed to investigate the cross-cultural validity and measurement invariance of the Impostor-Profile 30 (IPP) across six European countries, as well as across gender and age groups. The results provide partial support for our hypotheses. Hypothesis 1a (configural invariance) was supported, indicating a consistent factor structure across countries. Hypothesis 1b (metric invariance) was also supported after minor model adjustments. However, hypothesis 1c (scalar invariance across all six countries) was not supported due to substantial model misfit in the Italian sample. Hypotheses 2a-c (invariance across gender) were fully supported, indicating strict measurement invariance. Hypotheses 3a and 3b (configural and metric invariance across age groups) were supported, while hypothesis 3c (scalar invariance across age groups) was not supported.

These findings highlight both the strengths and boundaries of the IPP's cross-cultural applicability. While the instrument showed robust structural and metric consistency across multiple European languages and cultures, the Italian sample exhibited significant deviations. This suggests that cultural and linguistic nuances may influence the way impostor-related constructs are interpreted and emphasizes the necessity of thorough cross-cultural validation in psychometric research.

Dimensionality

The IPP aims to measure the general impostor expression and the phenomenon´s facets. In prior validation studies of the German (Ibrahim et al., 2021), English (Ibrahim et al., 2022b), and Swedish (Doshi et al., 2024) versions, the bifactorial model exhibited the best fit compared to a one-dimensional model, a model with six correlated scales, and a hierarchical model. Consistent with prior research, the bifactorial model demonstrated the best model fit across countries in this study. Therefore, we use this model for the examination of cross-cultural equivalence.

Cross-cultural equivalence

To evaluate cross-cultural equivalence, we tested Hypothesis 1, which proposed that the IPP would demonstrate structural, metric, and scalar equivalence across countries. The results partially supported this hypothesis. Configural invariance was established, indicating consistent relationships between observed and latent variables across the six countries. However, metric invariance thresholds were initially exceeded, necessitating adjustments to the CFA model using modification indices. Partial scalar invariance was ultimately achieved for five countries, excluding Italy, which failed to meet the required criteria. This finding highlights potential cultural variability in the interpretation of IPP items and underscores the need for further validation in more culturally diverse populations.

When testing MI across six countries, the instrument demonstrated configural invariance, indicating consistent relationships between observed and latent variables across countries. Initially, metric MI thresholds were surpassed, prompting adjustments to the CFA model using modification indices. Four error variances were released, with item pairs sharing wording and belonging to the same subscale. These adjustments led to the acceptance of partial metric measurement invariance. However, scalar measurement invariance thresholds were not met, leading to examining partial scalar MI by freeing constraints between groups. Based on modification indices, constraints of eight items (items 4, 16, 20, 25, 26, 28, 29, 30) were released, with model fit criteria remaining unmet. Descriptive analyses of individual subsamples revealed that the Italian sample exhibited the lowest model fit scores, and highest skewness across scales. Consequently, the Italian sample was excluded from further MI analysis. As a result, partial scalar MI was achieved among the Czech, English, German, Romanian, and Russian versions of the IPP, facilitating the derivation of shared norm values across these countries.

The lack of MI in the Italian sample may stem from demographic differences or meaningful differences in the latent trait. Examination of demographic aspects revealed that the Italian sample predominantly consisted of individuals with A-levels as the highest level of education (70%), which, however, did not differ notably compared to other subsamples such as Romania (64.9%) or Germany (77.1%). Similarly, the age distribution of the Italian sample (M = 25.24; SD = 10.78) appeared comparable to other subsamples, such as Czechia (M = 26.38; SD = 9.62) or Russia (M = 27.11; SD = 12.27). Thus, the demographic characteristics surveyed do not appear to cause the lack of MI in the Italian sample. Therefore, meaningful differences in the impostor expression could explain the difference between the five countries and the Italian sample, whereby future studies are needed to validate this hypothesis.

Next, we tested hypothesis 2, which proposed invariance across genders. The results demonstrated strict MI of the IPP between male and female participants, confirming equivalence and eliminating the need for gender-specific norm values.

Lastly, we tested hypothesis 3, which proposed invariance across age groups. Therefore, we tested measurement invariance across four defined age groups. The findings revealed no scalar MI between age groups, necessitating the derivation of specific norm values. Subsequently, the normal distribution of IPP total scores and subscales was examined

to determine whether interval-scaled or percentile-ranked norm values should be derived (Woerner et al., 2017a, b, p. 251). As the IPP scales were found to be non-normally distributed, percentile ranks were derived for individual diagnostic and interpretative purposes. The age-specific percentile ranks for the scales of the IPP are depicted in the supplements (Tables 4, 5, 6 and 7 A).

Constraints on generality

The target sample of this study primarily included individuals with an academic background, as the IP is particularly prevalent and relevant in this group (Brennan-Wydra et al., 2021). However, this focus introduces potential biases, as the findings may not generalize to non-academic populations or individuals in different professional or social contexts. Race and ethnicity were not collected, as only nationality was used as a cross-cultural variable, which may limit the ability to capture the broader diversity of experiences related to the IP. Additionally, the study focused on European and educated participants to assess the cross-cultural equivalence of the IP within comparable cultural contexts. While this approach provided valuable initial insights, it underscores the need for further validation in more diverse and global populations. Future studies should incorporate minority status and cultural dimensions beyond nationality, as minorities often report higher levels of IP (Cokley et al., 2013), potentially due to unique socio-cultural pressures.

Limitations

Our findings must be interpreted in light of several limitations related to sample characteristics, potential biases, and methodological constraints. Significant disparities in sample characteristics across countries were observed, including variations in sample sizes, age distributions, and educational attainment. For instance, the German sample was more than twice as large as the Romanian sample, with a mean age of 42 years compared to 23 years in the Romanian sample. Moreover, while 60% of the English sample held a master's degree, none of the participants in the German sample reported this level of education. These inconsistencies may have influenced the findings and reduced the comparability of results across countries. Additionally, the use of convenience and snowball sampling strategies likely introduced biases, as participants were predominantly recruited through academic and professional networks. This approach may have overrepresented individuals with higher educational attainment and access to digital platforms, potentially excluding underrepresented groups such as older adults, rural populations, or those with limited education.

The study's reliance on self-report measures also raises concerns about mono-method bias (Podsakoff et al., 2003), as responses may reflect subjective perceptions rather than objective evaluations of the IP. Incorporating additional data sources, such as other-ratings (Ibrahim et al., 2023) or behavioral assessments, could mitigate this limitation and provide a more comprehensive perspective. Furthermore, the lack of cross-cultural invariance in the Italian sample highlights the importance of cultural and linguistic validation. This finding suggests that the IPP items may be interpreted differently across contexts, necessitating further research to understand these variations. Additionally, the Eurocentric nature of this study limits the generalizability of its findings to non-European or non-Western populations, emphasizing the need for broader cross-cultural investigations.

Lastly, this study exclusively focused on the IPP, without including other convergent measures such as the CIPS. Using additional instruments in future research could provide more robust evidence for the constructs cross-cultural equivalence and help identify sources of observed differences. Addressing these limitations in future studies through a more holistic sampling strategy, multi-method approaches, and expanded cultural contexts will enhance the validity and applicability of findings in both research and practice.

Conclusion and practical implications

Taken together, the findings demonstrate that the IPP is a psychometrically sound instrument for measuring the multidimensional construct across several European contexts. For researchers, the established metric and partial scalar invariance allows for meaningful comparisons of structural associations and latent means across five countries. For practitioners, the availability of age-specific percentiles enhances the interpretability of IPP scores in clinical, educational, and organizational settings. However, the generalizability of these findings remains limited to culturally comparable, predominantly educated European samples. This study highlights that cross-cultural equivalence is not self-evident, and cross-cultural equivalence as a prerequisite for latent comparisons across different countries (Fischer et al., 2023) remains an important research subject for future research on the IP. Furthermore, this study represents the first standardization of an IP measurement instrument, paving the way for more robust cross-cultural comparisons in future research. The availability of age-specific percentile ranks allows researchers to explore developmental trajectories of the IP and examine how impostor feelings may vary across the lifespan. Future studies should therefore extend validation efforts to other European, non-European, minority, and non-academic populations to establish broader applicability and deepen our understanding of cultural

influences on impostor-related beliefs and behaviors. In addition, longitudinal research is needed to track the development of impostor feelings across the lifespan, especially during major life transitions such as entering the workforce or assuming leadership roles. Intervention studies may also benefit from leveraging the IPP's multidimensional profile to tailor culturally sensitive prevention or treatment approaches. Finally, extending the validation of the IPP to behavioral and peer-based data, and exploring the potential of adaptive digital formats, could further enhance its utility across psychological research and practice.

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