Mediterranean Journal of Clinical Psychology

ISSN 2282-1619

Volume 8, n 3, 2020

Clinical Psychology

Validation of the Italian version of the Injection Phobia Scale - Anxiety and application to blood donors

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Abstract

Anxiety related to medical procedures is pervasive, in particular for those involving needles and blood, such as injections and blood donations. Therefore, assessment and detection of anxiety before and during these procedures is critical for developing timely interventions for the at-risk population, and thereby increasing the panel of potential blood donors. The Injection Phobia Scale-Anxiety (IPS-Anx) was an 18 item questionnaire for estimating anxiety related to blood and needles; however, it had never been used among blood donors.

The measures were translated and tested during a pre-pilot phase (Study 1). During Study 2 (n = 344) and 3 (n = 370), the model of measurement of IPS-IT-Anx was evaluated by exploratory factor analysis and confirmatory factor analysis. Test-retest stability, convergent validity, and reliability of measures were assessed during Study 4 (n = 243). Finally, the scores from participants in the different studies were pooled (Study 5; n = 957) in order to test whether the factor structure showed multigroup invariance, and to evaluate whether IPS-IT-Anx scores were associated with blood donation.

The overall results of the statistical analysis supported a 12-item measurement model comprising the two original dimensions, distal and contact fear, of the IPS-IT-Anx.

The findings of the study supported IPS-IT-Anx, suggesting it had excellent psychometric properties and was suitability for each clinical research uses focused on the assessment of blood-injection anxiety.

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Keywords:
Injection Phobia Scale; Blood donation; Anxiety; Clinical psychology; Psychometrics.

Received: 11 September 2020
Accepted: 29 November 2020
Published: 19 December 2020

Citation: Bani, M., Pepe, A., Zorzi, F., Ardenghi, S., Rampoldi, G., Stepparava, M. G. (2020). Validation of the Italian version of the Injection Phobia Scale - Anxiety and application to blood donors. *Medieterranean Journal of Clinical Psychology, 8*(3). https://doi.org/10.6092/2282-1619/mjcp-2600

1. Introduction

The DSM-V defines specific phobia as a "marked fear or anxiety about a specific object or situation". These emotional reactions are disproportionate to the actual danger posed by the phobic object and can be triggered by a wide variety of stimuli such as flying, heights, animals, receiving an injection, seeing blood (Marks, 1988; Scollato & Lampasona, 2013; Settineri & Merlo, 2020). Specific phobia is one of the most common mental health problems (Kessler et al., 2005) and many studies show it can be related to temperament (Liotta, 2013), self-esteem (Manna et al., 2016) and age (Merlo, 2019; Odacı & Cikrikci, 2017).

One of the most studied specific phobias is the blood-needle-injury subtype, due to its wide impact on the health of patients. In contrast to many phobic disorders, excessive needle or blood fear could potentially have direct and serious consequences, as it could result in avoidance or procrastination of health maintenance, screening and management of chronic medical conditions, and seeking professional help (Kleinknecht & Lenz, 1989; Öst et al., 1992). Moreover, the psysiological reaction of blood phobics included a marked cardiac activation, a sympathetic increase and a greater vagal tone compared with spider phobics (Sarlo et al., 2002). Effective treatment strategies for this type of phobia included pure exposure, applied tension, applied relaxation and a combination of applied tension and relaxation, as reporte in a meta-analysis (Ayala et al., 2009).

Considering blood-injection anxiety on a continuum, below the clinical cut-off there is a large portion of the population that experiences a high level of anxiety related to medical procedures. For example, a recent systematic review (McLenon & Rogers, 2019) reports that nearly 20-30% of young adult exhibit fear of needles, and the prevalence is higher among adolescents and children. The authors conclude that needle fear is pervasive when undergoing venipuncture and blood donation, and can be a barrier for these medical practices.

Recently, also in the context of blood donation, it was shown that blood and needle anxiety is common among blood donors, with nearly one-third of even the most experienced donors reporting being affected (France & France, 2018).

The importance of an interdisciplinary approach for the analysis of complex phenomena, like blood-injection anxiety, has been highlithed in many contexts (Settineri et al., 2019) and is an interesting key of lecture.

In blood donation, one well-used questionnaire is the Blood Donation Reaction Inventory (France et al., 2008) which focuses on the assessment of pre-syncopal reactions among blood donors. More recently Chell and colleagues (2016) have validated a six-item version of the Spielberger State-Trait Anxiety Inventory. However, this questionnaire only assesses general anxiety, and not that directly related to needles and blood. Other studies have used only single items focused on blood or needle anxiety (France & France, 2018). While self-reporting measures have been developed over the years, their use has been limited due to excessive length and the inclusion of a wide range of other scenarios, such as sharp objects and physical examinations [e.g., Medical Fear Survey (Kleinknecht et al., 1999) and Multidimensional Blood/Injury Phobia Inventory (Wenzel & Holt, 2003)].

The only specific questionnaire available that explicitly assesses anxiety related to needles and blood is the Injection Phobia Scale-Anxiety (IPS-Anx) (Öst, 1992). This is an 18 items questionnaire that includes a number of situations related to needles.

Due to the lack of instruments to assess blood and needle anxiety on a wide range of subjects, the availability of a brief self-assessment questionnaire would be extremely useful for detecting Italian patients at risk for blood injection phobia and avoiding important medical procedures. A specific area of interest is blood donation, and a self-report questionnaire could help to identify donors at risk of deferring contributions due to anxiety, and in developing targeted interventions. The questionnaire could also assess the baseline level of needle anxiety among new donors, and consequently help develop a tailored route in terms of exposure to them, manage the frequency of donations, and provide for pre-syncopal prevention strategies (Thijsen & Masser, 2017). To date, the IPS-Anx has only been validated in English (Olatunji et al., 2010), and has never been used among a population of blood donors. Further validations are needed to confirm the factor structure of the questionnaire.

1.1 Aims

This study assessed the Italian version of the IPS-Anx, investigating the internal consistency, test re-test reliability, content, structural and convergent validity. It also assessed whether the bi-factorial structure of the scale was confirmed, comparing a sample of blood donors and non-blood donors in terms of needle anxiety.

2. Materials and methods

2.1 Study 1: Translation and cultural adaptation of the IPS-Anx

The adaption of the questionnaire to the Italian context followed standard procedures (Brislin, 1970; Pepe et al., 2017) of forward and back translation. Permission for translation was granted by the author of the original scale, Prof Lars-Göran Öst. A pre-pilot stage was prepared in order to preliminary evaluate the functioning of items in the translated version of IPS-Anx. Initially, three Italian professionals in clinical psychology provided a conceptual translation of the questionnaire items. The resulting version of the questionnaire was then back-translated by an independent translator whose mother-tongue was English. The two versions of the IPS-Anx were then compared in order to identify the most appropriate phrasing in cases of incongruency.

2.2 Study 2: Exploratory factor analysis

2.2.1 Sample

The sample was composed of 344 students recruited from graduate and undergraduate courses at a large north Italian university. The mean age of the sample was 23.4 years (standard deviation, SD 4.31; range 19-50), with > 84% of participants being female (n = 290). Approximately 10% of the sample was composed of active donators (n = 31). Participation in the study was free, and no incentive was provided. Students were invited to participate through an e-mail invitation that described the aims of the study, and included informed consent documentation that was signed digitally. Completion of the questionnaires took approximately 20 minutes. The e-mail contact of the main researcher was provided to clarify any issues. Ethics approval was obtained from the Institutional Board of the University of Milano - Bicocca.

2.2.2 Measure

The IPS-Anx (Öst, 1992) was an 18-item questionnaire that self-reported the degree of anxiety for a range of injection and/or venipuncture procedures; items were assessed on a 5-point Likert scale ranging from 0 (no anxiety) to 4 (maximum anxiety).

2.2.3 Strategy of analysis

Initially, all items were tested for potential floor or ceiling effects (Everitt, 2002), violations of normal distribution criteria (skewness and kurtosis values set at +2, -2), and missing value ratios and inter-item correlations. The primary outcome of Study 2 was to reduce the original number of questions, by only retaining psychometrically robust items (Veronese & Pepe, 2018). The items that satisfied the selection criteria then underwent exploratory factor analysis (EFA), to attain a parsimonious understanding of the empirical data by identifying a set of underlying dimensions accounting for as much variance as possible in the given set of observed indicators (Fabrigar et al., 1999). EFA had been particularly useful in cases of developing measurement scales, given that it allowed the retention of the most appropriate number of factors (Hayashi & Marcoulides, 2006). To this end, a principal component analysis was performed (PCA) (Ertel, 2013) and the solution was factorialized with oblimin rotation. The mineigen greater than 1.0 criterion (K1) (Kaiser, 1974) was adopted to identify the number of factors. Given the ordinal nature of scores, EFA was conducted on the polychoric matrix (Holgado-Tello et al., 2010) of correlations computed by using Lorenzo-Seva and Ferrando (2015) syntax for SPSS. Parallel Analysis (Watkins, 2000) was used to provide further support for the decision about the most appropriate factor structure to be adopted.

2.2.4 Results

Exploratory factor analysis (EFA) was applied to the scores (n = 344) on the 18 translated items of the Injection Phobia Scale – Italian Version – Anxiety (IPS-IT-Anx). Three factors were found to explain 78% of cumulative variance; KMO = 0.932 and Bartlett test ($\chi 2 = 7{,}785.5$, $p < 0.001$). However, the comparison with random eigenvalues generated from the parallel analysis (see Table 1) suggested a two-factor structure. Only 12 items loading on these two dimensions satisfied the criteria for acceptance, so the remaining items were dropped from the baseline measurement model (see Table 2). According to both the original Minimum average partials (MAP) and the revised MAP (O'Connor, 2000), the number of components correctly identified was two. All in all, the results of exploratory factor analysis suggested for the IPS-IT-Anx the adoption of a model composed of two correlated factor and 12 observed indicators.

Table 1. Eigenvalues and item saturation coefficient for the Italian version of Injection Phobia Scale

	Factor 1	**Factor 2**	**Factor 3**	**h2**
IPSanx12	0.977			0.921
IPSanx7	0.942			0.892
IPSanx13	0.926			0.924
IPSanx9	0.891			0.886
IPSanx10	0.876			0.826
IPSanx3	0.744			0.734
IPSanx11	0.679			0.560
IPSanx6	0.675			0.904
IPSanx17	0.635	0.436		0.883
IPSanx18	0.618			0.804
IPSanx2	0.609	0.481		0.878
IPSanx16		0.743		0.777
IPSanx15		0.728		0.447
IPSanx8		0.693		0.741
IPSanx5		0.652		0.542
IPSanx1		0.461		0.725
IPSanx14			0.910	0.699
IPSanx4			0.494	0.556
Eigenvalue from parallel analysis (500 samples)	1.56	1.34	1.27	
Actual Eigenvalue	11.22	1.69	1.17	
Explained variance (%)	62.3	9.4	6.5	
Cumulate Variance (%)	62.3	71.8	78.3	

Table 2. Convergent and discriminant validity of IPS-IT scores; n = 243

	1.	2.	3.	4.	5.
1. Distal Fear	-				
2. Contact Fear	0.681	-			
3. Disgust propensity	0.265	0.306.	-		
4. Disgust sensitivity	0.304	0.377	0.789	-	
5. Padua	*0.067*	*0.101*	0.422	0.431	-

Note: not statistically significant correlations were reported in italics; all other correlations were statistically significant at $p < 0.01$

2.3 Study 3: Confirmatory Factor Analysis

2.3.1 Sample

The sample was composed of 370 students recruited from graduate and undergraduate courses at a large north Italian university. The mean age of the sample was 24.1 years (SD 5.33, range 18-55), with over 77% of the participants being female (n = 282). Approximately 18% of the sample had a previous experience of blood donation (n = 31). The procedure was the same as that used for study 2, including the measuring system (IPS-Anx) (Öst, 1992).

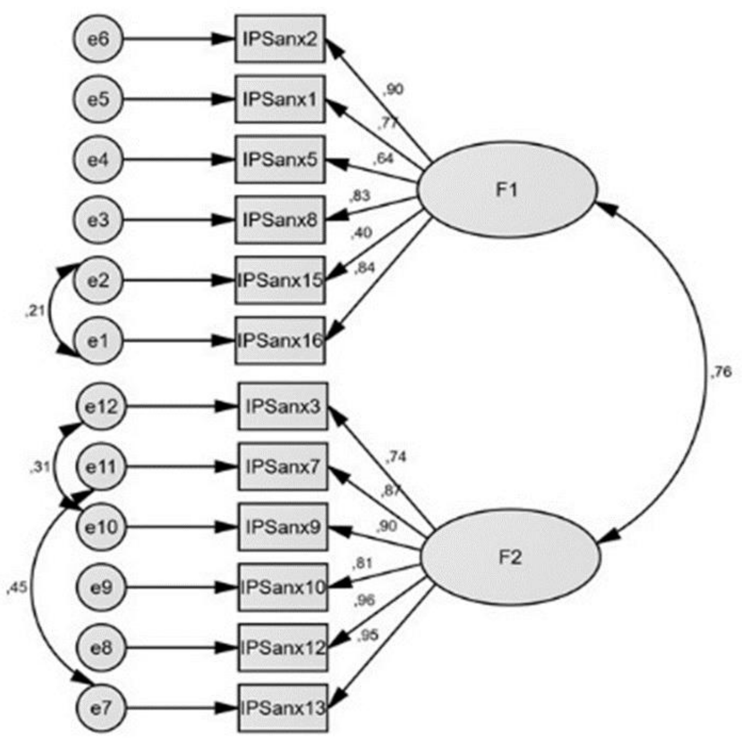
2.3.2 Strategy of analysis

The baseline model identified via EFA was subjected to CFA in an attempt to provide further evidence of construct validity (Gagne & Hancock, 2006). The following absolute and relative fit indexes were adopted: $\chi 2$, Normed-Chi Square (NC), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual, Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) (Hu & Bentler, 1999). Model fit was taken to be robust if NC was <2.0, RMSEA < 0.08, CFI and TLI > 0.95 (Marsh et al., 2014). In order to test the robustness of the baseline model of measurement for the Italian version of the IPS, two different nested models were estimated: first a unidimensional model (M1) was tested, then parameters of a two-dimensional model (M2; composed of the baseline model of measurement) were estimated. The Akaike Information Criterion (AIC) was adopted to compare models (Sakamoto et al., 1986). All analyses were conducted using Amos 21 (Arbuckle, 2011). Finally, the Raykov composite reliability (CR) coefficient (cut-off point CR > 0.70) (Raykov, 1997) was calculated to evaluate the internal consistency of the scales.

2.3.3 Results

The results of confirmatory factor analysis conducted on the uni-dimensional model of IPS-IT-Anx (M1, all items loading on a single latent factor) revealed a rather poor fit [$\chi 2 = 1,076.5$, $p < 0.001$; RMSEA = 0.185, NFI = 0.818, TLI = 0.791, CFI = 0.829, AIC = 811.01] meaning that the model should be refused. Then, M2 (permitting item-level errors $\theta_{i,j}$ to covary) was specified. This decision was ground on the idea that it is often necessary to allow correlated uniqueness in modeling practices to represent non-random measurement errors that might be linked to the measure or local specificities characterizing the sample (Byrne et al., 1989). The analysis supported the acceptance of the bi-dimensional model composed of two interdependent ($\varphi 12 = 0.76$) and three covariances in item-level errors. All goodness of fit index converged in supporting the model: $\chi 2 = 166.5$, $p < 0.001$; RMSEA = 0.079, NFI = 0.959, TLI = 0.962, CFI = 0.971, AIC = 0.971. Analysis of the factor loadings ($\lambda i,j$) revealed that all the items displayed strong practical significance with λ values above the recommended cut-off point ($\lambda > 0.3$) at a high level of statistical significance ($p < 0.001$). Details for factor loadings of IPS-IT-Anx were reported in Figure 1.

Figure 1. Results of confirmatory analysis on the structural model of measurement for IPS-IT-Anx



Concerning covariation among item uniqueness, the following parameters were specified on the distal fear factor: items 3 and 9 ($\theta_{3,9}=0.31$), items 13 and 7 ($\theta_{13,7}=0.45$). On the contact fear scale, the only allowed co-variation was between items 16 and 15 ($\theta_{16,15}=0.21$).

Raykov's composite reliability revealed excellent scale internal consistency for both contact fear (CR = 0.879) and distal fear (CR = 0.951) measures.

2.4 Study 4: Convergent validity and test-retest stability of scores.

2.4.1 Sample

The sample was composed of 243 students recruited from graduate and undergraduate courses at a large north Italian university. The mean age of the sample was 23.4 years (SD = 4.38, range 18-50), with over 82% of the participants being female (n = 198). Approximately 20% of the sample had a previous experience of blood donation (n = 48). The procedure was the same as that used for study 2.

2.4.2 Measures

IPS-IT-Anx (Öst, 1992) as described in Study 1-3 was used on the same participants at the beginning of the study and after three months.

The Disgust Propensity and Sensitivity Scale-Revised (DPSS-R) (Van Overveld, 2006) [Italian validation (Pozza et al., 2016)], assessed the frequency and emotional impact of experiencing disgust (propensity and sensitivity). It included 16 items rated using a 5-point Likert scale from 1 (never) to 5 (always). The internal consistency in the present study was good for both dimensions, propensity (Cronbach's $\alpha = 0.763$) and sensitivity (Cronbach's $\alpha = 0.705$).

The Padua Inventory–Contamination Fear Subscale (PI) (Sanavio, 1988) [Italian Validation (Mancini et al., 1999)] consisted of 10 items assessing contamination fear. Items were scored on a 5-point scale ranging from 1 (not at all) to 4 (very much). The fear subscale of PI demonstrated good internal consistency in the present study (Cronbach's $\alpha = 0.878$).

2.4.3 Strategy of analysis

The use of multiple measures to assess convergent validity was common in the framework of the development of new measures. Zero-order correlation analysis was consequently performed to test convergent and discriminant validity of IPS-IT-Anx. Convergent validity was the extent that different measures of the same construct converged or strongly correlated with one another (Netemeyer et al., 2003). From this point of view, we expected a positive correlation between both scores of distal and contact fear of injections and measures of disgust propensity and sensitivity (DPSS-R). With regards to discriminant validity, we did not expect statistically significant correlations between IPS-IT-Anx measures and the global PI score. In study 4, inter-class correlations (ICC) along with 95% confidence intervals were computed in order to evaluate the test-retest stability of scores. Bonferroni correction for statistical significance was applied; consequently, p value was set at < 0.025.

2.4.4 Results

Descriptive statistics and zero-order correlations are summarized in table 2.

Zero-order correlations revealed, in general, medium and statistical significative associations between IPS-scores and Disgust Propensity and Sensitivity Scale with values ranging from 0.377 to 0.265. As expected, Padua scores were not associated with IPS-IT-Anx scores whereas they were correlated to scores on disgust propensity and sensitivity scale.

As reported in Table 3, the 3-months test-retest reliability of the IPS-IT-Anx total score and subscales in the total sample was high, with an intraclass correlation coefficient (ICC) ranging from 0.84 (contact fear) and 0.94 (distal fear).

Table 3. Descriptive statistics and test-retest stability of IPS-IT-Anx scores; n = 243

	Time 1		**Time 2**				
	M	SD	M	SD	ICC	95% LB	95% UB
1. Distal Fear	8.85	6.34	8.58	6.01	0.936	0.917	0.950
2. Contact Fear	6.73	7.36	6.32	6.89	0.839	0.793	0.875
3. IPS total score	15.58	12.70	14.91	11.95	0.872	0.835	0.900

Note: LB = Lower Bound, UB = Upper Bound

2.5 Study 5: Multigroup invariance and Predictive validity

2.5.1 Sample

In study 5, data gathered from studies 2-4 were merged to provide 957 participants that had completed IPS-IT-Anx. The mean age of the sample was 23.8 years (SD 4.92, range 18-50), with approximately 80% of participants being female (n = 772). Approximately 20% of the subjects had donated at least once in the past (n = 228) and 150 (15.7%) were active donors.

2.5.2 Procedure and measure

Participants completed the IPS-IT-Anx as described in Study 1, and were asked to respond to two items assessing historical instances of fainting ("Have you ever fainted, almost fainted, or felt dizzy during medical procedures such as giving blood or receiving injections?") and avoidance ("Have you ever avoided, delayed, or put off medical procedures because you were afraid of blood, needles, injections, etc?") in the context of injection situations, according to the previous validation study (Olantunji et al., 2010).

Next, multiple-group CFA (MGCFA) (Byrne, 2016) was performed to test measurement invariance across two parallel sets of data. Specifically, the invariance of IPS-IT-Anx was evaluated across gender-based cohorts of adolescents. The hypothesis of measurement invariance was accepted if configural invariance, metric invariance, strong invariance, and full construct invariance were all supported. Equivalence of the measure across groups was to be rejected if the difference between the two models was statistically significant. The parameter for rejecting invariance was set at >0.01, corresponding to a p level of 0.01 (Chen, 2007). The different types of invariance were hierarchically ordered, meaning that the MGCFA procedure would end at the lowest level of invariance that was not satisfied (Cheung & Rensvold, 2002).

In addition, the predictive validity of IPS-scores was evaluated by using discriminant multivariate analysis. The discriminant function was estimated to determine whether distal and contact fear scores could determine the self-reported history of blood donations. Appropriately for a two-group scenario such as this, the function was assessed by means of Fisher's linear discriminant function, using a stepwise procedure. In order to evaluate the function's discriminatory power, two outputs were assessed: Wilk's Lambda and the canonical discriminant function. Wilk's Lambda estimates the portion of total variance that is not explained by differences between groups. The canonical discriminant function allows estimating the % of case membership predicted by the multivariate interaction of variables.

2.5.3 Results

MGCFA was used to evaluate the measurement invariance of IPS-IT-Anx across the subsamples of male and female students. According to standard procedures, configural invariance was assessed first, and then compared to the other more robust types of equivalence. The multi-group analysis provided numerical support for accepting IPS-IT-Anx as structurally equivalent: $\chi^2 = 497.3$, $p < 0.001$; RMSEA = 0.063, NFI = 0.954, TLI = 0.956, CFI = 0.963. Composite reliability values were 0.89 (Contact fear) and 0.97 (Distal fear).

The following step tested item-level metric invariance ($\Lambda_g = \Lambda_{g'}$) by constraining all loadings to be equal across groups, and by accepting this kind of equivalence: $\chi^2 = 508.7$, $p < 0.001$; RMSEA = 0.061, NFI = 0.953, TLI = 0.956, CFI = 0.963. This means that the way that each item is related to its underlying construct may be considered the same for both groups.

The residual variance-invariance was tested, with the results again suggesting acceptance of the equivalence of the model: $\chi^2 = 585.9$, $p < .001$; RMSEA = .062, NFI = 0.946, TLI = 0.954, CFI = 0.957. Finally, the complete invariance test [$\chi^2 = 595.9$ $p < 0.001$; RMSEA = 0.062, NFI = 0.945, TLI = 0.955, CFI = 0.957] supported the metric invariance of the factor structure of IPS-IT-Anx across the two groups. This means that potential differences among male and female scores should not be ascribable to discrepancies in the psychometric functioning of the questionnaire (see Table 4).

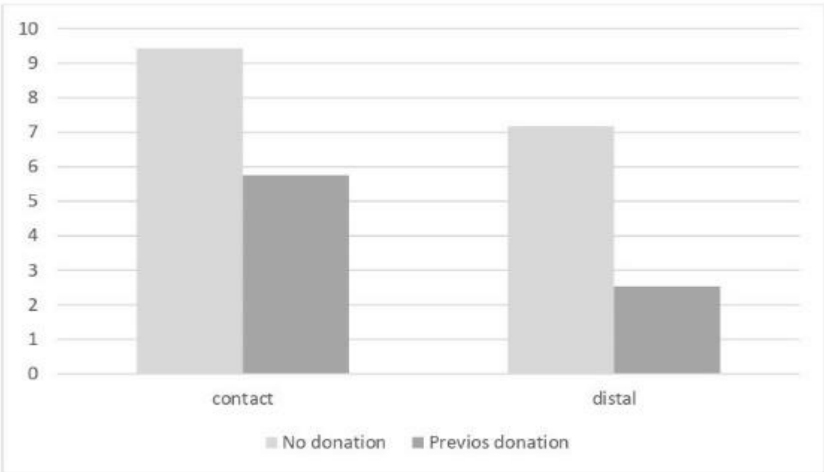
Table 4. Differential fix indexes in relation to nested type of measurement invariance; n = 957

	ΔNFI	ΔTLI	ΔCFI	ΔRMSEA	Invariance
Configural invariance	-	-	-	-	Accepted
Item-level metric invariance	0.001	0.004	0.001	0.002	Accepted
Residual variance invariance	0.007	0.002	0.006	0.001	Accepted
Complete invariance	0.001	0.001	0.001	0.001	Accepted

Note: invariance test was rejected for Δ > 0.01(Chen, 2007).

With regards to predictive validity, a discriminant linear function was estimated to assess whether IPS-IT-Anx scores were able to discriminate between participants with self-reported histories of previous donations. The overall Wilks's function was statistically significant (Λ = 0.91, χ^2 = 89.1, $p < 0.001$), suggesting contact fear and distant fear were able to differentiate individuals of the two groups (see figure 2).

Figure 2. Mean scores on contact and distal fear scales by groups.



Scores of contact fear (M = 0.96, $p < 0.001$) revealed a stronger contribution in classifying cases compared to distal fear. In terms of predictions, the linear function was particularly efficient in classifying donors (80%).

3. Discussion

3.1 Exploratory factor analysis

In Study 2, by using an oblique rotation of data, two different components were found to explain approximately 72% of the cumulate variance. The first factor included items related to distal fear (e.g., looking at a picture with a syringe and needle, listening to someone talking about injections) and partially overlapped with the original dimension of IPS. Items concerning contact fear saturated the second factor (e.g., having a shot in the upper arms, getting an injection in the buttock). The resulting measurement model (two factors, 12 items) emerging from the non-clinical sample was used as a baseline structure for the subsequent stages of the study

3.2 Exploratory factor analysis

In Study 3, results of CFA suggested that the IPS-IT scores fitted with two factors assessing contact fear and distal fear of injections. The two factors reported a high co-variation (0.76) and good internal consistency; however, the evaluation of an uni-dimensional solution did not fit with the empirical data. Analysis of incremental fit indexes indicated that the two-dimensional model was more robust from the statistical point of view. Accordingly, the two-dimensional model of measurement was further evaluated by mean of test-retest stability and convergent validity.

3.3 Convergent validity and test-retest stability of scores

Study 4 suggested that both measures of the IPS-IT-Anx have robust test-retest stability. Importantly, convergent and discriminant validity revealed that scores on distal and contact fear correlate with a conceptually related domain (e.g., disgust). In general, the analysis gathered from study 2 to study 4 converged in supporting the adoption of the IPS-IT-Anx self-report questionnaire to evaluate participants fear of injection. Having established the factor structure of the reduced version of the IPS, we finally tested the model of measurement in the last dataset composed of participants to the different studies presented in the manuscript. In study 5, multigroup confirmatory factor analysis (MGCFA) was performed to test the hypothesis of measurement invariance between different cohorts of male and female. The full sample was also used to assess the predictive validity of IPS-IT-Anx scores in such a way that contact and distant fear were able to discriminate between actual blood donors and participants who never donate blood.

3.4 Multigroup invariance and Predictive validity

The re-examination of the factor structure of the IPS-IT-Anx, along with measurement invariance and its ability to differentiate between participants' group (Study 5), supported its adoption in empirical conditions. CFA conducted on a larger sample revealed the consistency of a two-factor solution (distal and contact fear), which was structurally invariant in cohorts of males and females. The two scales were characterized by high internal consistency. In addition, discriminant analysis revealed that the two domains of the IPS-IT-Anx significantly differentiated those that had a history of blood donations, suggesting that the questionnaire might have ecological validity in a clinical setting. Finally, the abbreviated version might be particularly useful in empirical contexts requiring quick and efficient assessment tools.

4. Conclusions

The psychometric properties of the IPS-IT-Anx were excellent and similar to those reported in previous validation work (Olantunji et al., 2010). The current study confirmed that the two factors structure was also mantained in the 12-item version of IPS-IT-Anx. The availability of a shorter, reliable, valid, and sensitive scale to assess blood and injection anxiety is crucial for both research, and clinical assessment IPS-IT-Anx has also demonstrated promising with regard to assessing blood donors.

4.1 Limitations and recommendations for future research

This study confirmed the excellent psychometric properties of the IPS-IT-Anx; however, there were some limitations. The sample included only young adults, and needle anxiety is known to have a higher prevalence in children and to decline with age. Future studies should consider a population with a broader age range. The sample in the current study included both donors and non–donors. A tailored analysis of only blood donors, ranging from novices to experienced contributors, could confirm previous data on blood and needle anxiety among such individuals, particularly in a longitudinal study. The inclusion of predictive assessments of blood donation related outcomes (e.g., venipuncture pain, vasovagal reactions, and donor retention) are needed. The availability of a short, valid, and reliable questionnaire can contribute to increase research in this area.

Acknowledgments

MB contributed to the design, conduct e the writing of the manuscript, AP contributed to data analysis and writing, FZ, SA, GR, MGS participated in data acquisition, interpretation and revised the manuscript.

We are thankful to prof. Bunmi O. Olatunji for his assistance in the back-translation procedure.

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DOI: 10.6092/2282-1619/mjcp-2600

Appendix A

IPS-IT-ANX

Below follows a description of a number of situations, involving needles and/or injections, in which persons can experience anxiety or fear. Read each item and rate on a scale from 0 to 4 how much anxiety you would experience if you actually were in the situation.

	No anxiety				Max anxiety
1. Giving a blood sample by having a finger pricked	0	1	2	3	4
2. Having a shot in the upper arm	0	1	2	3	4
3. Looking at a picture with a syringe and needle	0	1	2	3	4
5. Having an anesthetic injection at the dentist's	0	1	2	3	4
7. Watching another person having a venipuncture in reality	0	1	2	3	4
8. Getting an injection in the buttock	0	1	2	3	4
9. Looking at a picture of a person getting a shot	0	1	2	3	4
10. Listening to someone talking about injections	0	1	2	3	4
12. Watching a film about a person getting a shot	0	1	2	3	4
13. Watching another person getting a shot in reality	0	1	2	3	4
15. Having one's ears pierced	0	1	2	3	4
16. Getting a vaccination	0	1	2	3	4

Appendix B

IPS-IT-ANX

Di seguito viene descritta una serie di situazioni in cui le persone possono sperimentare ansia o paura. Leggi ogni situazione e valuta quanta ansia proveresti se ti trovassi effettivamente nella situazione, usando una scala da 0 a 4 dove 0=nessuna ansia e 4=ansia massima.

	Nessuna ansia				Massima ansia
1. Farsi pungere un dito per prelevare un campione di sangue	0	1	2	3	4
2. Farsi praticare un'iniezione nel braccio	0	1	2	3	4
3. Guardare la foto di una siringa con l'ago	0	1	2	3	4
5. Farsi praticare un'iniezione di anestetico dal dentista	0	1	2	3	4
7. Guardare dal vivo un'altra persona a cui viene praticata un'iniezione endovenosa	0	1	2	3	4
8. Farsi praticare un'iniezione in un gluteo	0	1	2	3	4
9. Guardare la foto di una persona a cui viene praticata un'iniezione	0	1	2	3	4
10. Ascoltare qualcuno che parla di iniezioni	0	1	2	3	4
12. Guardare un filmato di una persona a cui viene praticata un'iniezione	0	1	2	3	4
13. Guardare dal vivo un'altra persona a cui viene praticata un'iniezione	0	1	2	3	4
15. Farsi fare un buco all'orecchio	0	1	2	3	4
16. Farsi praticare una vaccinazione	0	1	2	3	4