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Psychometric properties and validation of the Italian version of the Medical Fear Survey- Short Version

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Abstract

Background: Assessing medically-related fears is of paramount importance to foster medical positive experiences and outcomes and requires an easy-to-administer tool. The Medical Fear Survey-Short Version (MFS-SV) is a 25-item questionnaire assessing 5 medically related fears (Injections and Blood Draws, Sharp Objects, Blood, Mutilation, and Examinations and Symptoms).

Methods: To examine the psychometric properties of the Italian version of the MFS-SV, exploratory and confirmatory factor analysis were performed on data from 1010 young adults (68.8% female, mean age= 23.9±5.05) who provided demographic information and completed the MFS-SV, the Padua Inventory-Contamination Fear Subscale, the Disgust Propensity and Sensitivity Scale revised (DPSS-R) and the Injection Phobia Scale-Anxiety (IPS-Anx). Convergent validity, reliability, test-retest stability, and multigroup invariance were assessed. Discriminant analysis explored the potential screening function of the MFS-SV.

Results: The 5-factor structure of the questionnaire was confirmed, explaining the 68.8% of variance. Raykov's composite reliability coefficients ranged between .84 and .95. Test-retest stability, convergent validity, and the consistency of the scores across gender were confirmed. The MFS-SV could discriminate subjects with a history of blood donations (Wilk's Lambda = 0.915; $p < 0.001$).

Conclusion: The overall results supported the psychometric properties of the MFS-SV and its suitability for both research and clinical uses to assess different medical fears.

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1. Introduction

Specific phobias defined as an intense, irrational fear of something that poses little or no actual danger (NIMH, 2017), are amongst the most common mental health problems with a lifetime prevalence worldwide ranging from 3% to 15%, with female being more affected (Eaton et al., 2018; NIMH, 2017). Recently Eaton and colleagues (2018) identified 25 population-based studies exploring the prevalence of specific phobias in adults and indicating that the most prevalent subtypes were animals, heights and flying. Some factors related to specific phobia include temperament (Liotta, 2013), self-esteem (Manna et al., 2016) and age (Merlo, 2019; Odacı & Cikrikci, 2017).

When looking at specific healthcare-related phobia subtypes, the blood-needle-injury phobia presented a lifetime prevalence ranging from 2.1% to 4.5% and a 12-month prevalence of 3.6%. The broader category of fear of blood has a lifetime prevalence ranging from 7.4% to 13.9%. Fear of blood or injection and specific phobia related to this object have received a wide attention due to the potential impact on people's health (Taddio et al., 2012). Fear of blood and needles has found to be associated to vaccine avoidance amongst adult patients, hospital employees, and even healthcare workers (McLenon & Rogers, 2019) while fear of needles in pregnant woman can lead to the postponement of routine blood tests (McAllister et al., 2012). Detecting, treating and preventing these fear could lead to many physical health benefits, including promoting health-related behaviours (i.e., vaccination, blood donation, blood test, etc.) and reducing the avoidance of doctors and medical procedures that are essential to care. This is particularly relevant considering the current global effort for mass vaccination against COVID-19 and its impact on wellbeing (Commodari et al., 2021; Veronese et al., 2021). Blood and needle anxiety and phobia could represent a barrier for a timely vaccination and a misrecognition of these issues can increase vaccine hesitancy (Love & Love, 2021).

Blood donation is another health-related and pro-social behavior that is heavily affected by blood and needles anxiety or phobia. Many studies have shown that fear of blood and needles are amongst the main reasons to not donate reported by non-donors (Zucoloto et al., 2019). Surprisingly, a high prevalence of blood and needles fear amongst blood donors has been found (France & France, 2018). A donation-related fear assessment can be relevant to detect and support donors at risk of vasovagal reactions and drop out (France et al., 2021).

Due to the variety of health situations and objects that can trigger anxiety and specific phobia, many instruments have been developed to assess medical fear and anxiety but often they focus on specific fear such as injection (Olatunji et al., 2010) or blood donation (Chell et al., 2016).

Nevertheless, a flexible instrument covering a wide range of situations can be relevant for both research and clinical practice. The Medical Fear Survey (MFS) offers this flexibility. MFS is a 50-item self-report measure assessing medically related fears across five areas: *Injections and Blood Draws*, *Sharp Objects*, *Blood*, *Mutilation*, and *Examinations and Symptoms* (Kleinknecht et al., 1999). The MFS has been currently translated and validated only in Serbian (Djokovic et al., 2016) and the MFS-SV in Hungarian (Birkás et al., 2021) limiting the possibility of cross-cultural studies and comparisons. The MFS has been used in the context of blood donation to assess the predictive role of fear for medical procedures on intention to donate and on vasovagal reactions. Labus and colleagues (2000) used three subscales of the Medical Fears Survey (fear of *Injections and Blood Draws*, fear of *Blood*, fear of *Mutilated Bodies*) to predict vasovagal reactions amongst blood donors and founded that fear of injections and blood draws was the best predictor of vasovagal reactions in female – but not male – donors. Ditto and colleagues (2012) used the MFS to predict vasovagal reactions among blood donors (using both subjective and objective measures) but focused on specific items rather than subscales. Items related to fear of experiencing or seeing blood loss were more closely associated with vasovagal reactions.

Although the psychometric properties of the MFS are good, its length limited its usage. To overcame this limitation, in 2012 a 25-item version of MFS (MFS-SV) was proposed (Olatunji et al., 2012) confirming the good psychometric properties. A Hungarian traslation of MFS-SV has been recently validated supporting the five-factor structure of the questionnaire (Birkás et al., 2021). Further validations are however needed to confirm the factor structure of the short form of the questionnaire and its utility as a screening measure. Instruments to assess medical-related fears in Italy are scant and a brief self-assessment questionnaire to detect people at greater risk to be used in research and clinical settings is most needed (Bani et al., 2020).

1.1 Aims

This study assessed the Italian version of the MFS-SV and explored the factor structure of the MFS-SV in an Italian sample (Exploratory Factor Analysis and Confirmatory Factor Analysis, Analysis 1 and 2). The MFS-SV internal consistency, test re-test reliability, content, structural and convergent validity with similar measures were also investigated (Analysis 3 and 4). Finally, we assessed the discriminant ability of the MFS-SV for blood donors and non-blood donors and for DSM-V-based phobia-related questions (Analysis 5). In addressing these objectives, we aimed to provide valuable information on the relevance and impact of MFS-SV usage in the context of blood donation to guide recommendations and interventions targeting specific medical fears in this setting.

2. Methods

2.1 Participants and Procedure

A convenience sample of university students was recruited from a medium-size university in northern Italy. Inclusion criteria were being older than 18 years old, reside in Italy and could read and write in Italian sufficiently to complete the questionnaire and provide informed consent. Participation was voluntary and there were no incentives associated with it. An invitation email describing the purposes of the study and a link to the online survey was sent to students. Informed consent was collected digitally. Survey completion required approximately 20 minutes.

The choice to include a sample of university students was made considering data on the prevalence of medical fears and previous studies using the same instrument. As stated above, the prevalence of specific phobia is limited, and considering the blood-injection-injury subtype prevalence is much more limited (nearly 2%); however, even a high level of medical fear and anxiety in healthy subjects (not necessarily a specific phobia) represent a barrier for vaccinations and blood donation. According to a systematic review (McLenon & Rogers, 2019) fear of needles among adolescents has a prevalence estimate ranging from 20-50%. For adults who were 20–40 years, the prevalence of needle fear approximated 20-30% and dropped down for older people. The inclusion of a sample of university students contributes to including both healthy students and students with a clinical level of anxiety. Moreover, all the previous validation studies of MFS (except one, Birkas et al., 2021) have used a sample of students, and an analog sample contributes to the comparability of results.

Ethics approval was obtained from the University of Milano-Bicocca Ethics Committee (study Prot. n° 339, 0059772/17).

For psychometric testing, sample size was estimated based on the 5:1 participants/data sets per item criterion (Tabachnick et al., 2007), and at least 200 participants were recommended for Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) using structural equation modelling (Hair et al., 2010).

We randomly split the total sample (N = 1010) into three sub-samples of equal size, each displaying similar participants' socio-demographic features (see Table 1). EFA was conducted with the first sub-sample (N = 318; Analysis 1), CFA was conducted with the second sub-sample (N = 306, Analysis 2), whereas validity, reliability, and test-retest stability used the third sub-sample (N =386, Analysis 3). Multigroup invariance and predictive validity were conducted on the second plus third sample (N = 692, Analysis 4), while predictive validity on DSM-V-based phobia-related questions was done on a sub-sample of 104 participants.

2.2 Measures

Participants were asked to provide some demographic information and complete the Italian version of the MFS-SV (Olatunji et al., 2012), the Injection Phobia Scale – Anxiety (IPS-ANX; Bani et al., 2020; Öst et al., 1992), the Padua Inventory – Contamination Fear Subscale (PI; Mancini et al., 1999; Sanavio, 1988) and the Disgust Propensity and Sensitivity Scale – revised (Pozza et al., 2016; Van Overveld, 2006).

The MFS-SV (Olatunji et al., 2012) is a self-administered questionnaire, composed by 25-items measured on a 4-point Likert scale ranging from 0 (No fear or concern at all) to 3 (Intense fear). The MFS-SV has five subscales, whose scoring are obtained by summing up the scores of the individual items that form each subscale: *Injections & Blood Draws* (items 8, 12, 16, 18); *Sharp Objects* (items 1, 3, 13, 15, 17); *Examinations & Symptoms* (items 4, 6, 9, 20, 22, 24); *Blood* (items 2, 5, 11, 14, 25) and *Mutilation* (items 7, 10, 19, 21, 23).

The adaption of the MFS-SV to the Italian context followed standard procedures (APA, 2013) of forward and back translation. 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 MFS-SV were then sent to the author of the original scale (R.K.) in order to identify the most appropriate phrasing in cases of incongruency (Appendix 1).

The IPS-ANX (BLINDED REF; Öst et al., 1992) is a self-report questionnaire composed by 12 items measured on a 5-point Likert scale. The respondents are asked to indicate the level of anxiety (from 0 to 4) they would experience in situations related to injections and blood draws. The questionnaire measures two subscales (*Contact Fear* and *Distal Fear*) and a total score.

The PI (Mancini et al., 1999; Sanavio, 1988) contains 10 items measured on a 5-point Likert scale (0 = "Not at all"; 4 = "Very much") assessing the intensity of contamination obsessions and washing compulsions.

The Disgust Propensity and Sensitivity Scale-Revised (DPSS-R) (Van Overveld, 2006) [Italian validation (Pozza et al., 2016)], include 16 items on a 5-point Likert scale from 1 (never) to 5 (always) and assess the frequency and emotional impact of experiencing disgust (propensity and sensitivity), a construct theoretically related to medical fears (in particular to blood-injection-mutilation sub-types).

According to previous studies (Birkas et al., 2021; Olatunji et al., 2010), a subsample of participants was asked to respond to six additional true-false questions based on DSM-V criteria for specific phobias (APA, 2013).

2.3 Statistical Analyses

Descriptive statistics were used to summarize the data. To identify the MFS-SV underlying dimensions of the observed indicators, EFA was conducted using the Principal Axis Factoring method of factors extraction and Oblimin (Delta=0) rotation. Minimum Average Patrials (MAP) and Parallel Analysis were used to support the final decisions. Given the ordinal nature of the scores, EFA was performed on the polychoric correlation matrix (Analysis 1).

A Confirmatory Factor Analysis (CFA) was then performed to assess the construct validity of the questionnaire, using the following fit indexes: normed χ^2 (NC, <2.0), Root Mean Error of Approximation (RMSEA), Normed Fit Index (NFI), Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI). The recommended cutoff scores to assess the model fit are debated and according to recent studies (Montoya & Edwards, 2021) and commonly accepted cutoff (Hu & Bentler, 1999) we adopted the following ones: TLI/CFI values greater than 0.90 are consider indicative of "good fit" and values greater than 0.95 are considered "excellent"; RMSEA values <.10 are considered acceptable, <.08 good, <0.05 very good. Three models, based on the results of the EFA, were analyzed and their fit indexes compared to decide which factor structure to retain. Raykov's Composite Reliability coefficients (CR; cut-off CR > .70) were calculated to assess the internal consistency of the scales (Analysis 2).

In Analysis 3, zero-order correlations of the three questionnaires were analyzed to evaluate the convergent and discriminant validity of the MFS-SV. Mild to high correlations were expected with the IPS-ANX, the highest being with the *Injection & Blood Draws* and the *Blood* subscales, and with the DPSS-R (theoretically related to medical fears). Low correlations were expected between the MFS-SV and the PI. Discriminant validity was further inspected setting a structural equation model with the MFS-SV and the PI, to evaluate point estimate factor correlations (< 0.90 cut-off) and their upper-bound confidence intervals (< 0.80 cut-off). Reliability was assessed calculating the Ordinal-Alpha coefficients and through the test-retest analysis.

In Analysis 4 multigroup invariance (MGCFA) and predictive validity were conducted. MGCFA was performed to assess invariance across two gender-based groups (N_{male} = 302; N_{female} = 390).

The measurement invariance hypothesis would be accepted if configural invariance, metric invariance or full construct invariance were supported. Differences between fit indexes were evaluated, setting the cut-off for rejecting invariance at $\Delta_{1-2} > |0.01|$. Predictive validity was evaluated through the discriminant multivariate analysis, to assess whether the MFS-SV scores could discriminate between blood donors and non-donors. Fisher's linear discriminant function was calculated with a stepwise procedure. The Wilk's Lambda and the canonical discriminant function were evaluated. Data were analyzed with the IBM AMOS 27.0 software.

3. Results

3.1 Participants

The total sample mean age was 23.9±5.05 (range 18 – 56) and the 68.8% were female. About 15% of subjects were active blood donors (n = 154; 15.2%) and 23.4% had donated blood in the past (n = 236). Details on the social and demographic characteristics of the total sample and sub-samples are reported in Table 1.

Table 1. Sociodemographic characteristics of participants

	Analysis 1 (N = 318)	Analysis 2 (N = 306)	Analysis 3 (N = 386)	Analysis 4 (N = 692)	Total sample (N = 1010)
Age (years) M(SD)	24.1 (±5.49)	23.7 (±4.64)	23.9 (±4.99)	23.8 (±4.84)	23.9 (±5.05)
Gender N (%)					
Male	54 (17%)	76 (24.8%)	228 (59.1%)	302 (43.6%)	358 (31.2%)
Female	264 (83%)	230 (75.2%)	158 (40.9%)	390 (56.4%)	652 (68.8%)
History of blood donation N (%)	78 (24.5%)	65 (21.2%)	93 (16.6%)	158 (22.8%)	236 (23.4%)

3.2 Analysis 1 – Exploratory Factor Analysis

Five factors were extracted, accounting for 68.8% of the explained variance (KMO = 0.800; Bartlett's χ^2 = 8152.599, p < .001). The item loadings (Table 2) reproduced a factor structure very similar to the original version of the questionnaire, except for the item1 ("Cutting with a hunting knife"; *Sharp Objects* subscale), which loaded the fourth factor with the items belonging to the *Mutilation* subscale. Moreover, the items of the *Injections & Blood Draws* subscale saturated the fifth factor and cross-loaded the first factor together with the items of the *Blood* subscale.

The MAP test identified five (original test) to six (revised test) components, while Parallel Analysis suggested to retain three. Therefore, while the EFA suggests the original structure of the MFS-SV could be retained, the final decision would be made according to the results of the Confirmatory Factor Analysis.

Table 2. Factor loadings and item communalities

	Factor1 *Blood*	Factor2 *Sharp Objects*	Factor3 *Examinations & Symptoms*	Factor4 *Mutilation*	Factor5 *Injections & Blood Draws*	h2
MFS-SV 2	0.898					0.872
MFS-SV 25	0.887					0.961
MFS-SV 11	0.867					0.904
MFS-SV 5	0.808					0.800
MFS-SV 14	0.752					0.789
MFS-SV 16	*0.582*				0.439	0.745
MFS-SV 12	*0.573*				0.529	0.886
MFS-SV 18	*0.528*				0.402	0.802
MFS-SV 20		0.795				0.697
MFS-SV 22		0.761				0.643
MFS-SV 6		0.693				0.516
MFS-SV 9		0.633				0.495
MFS-SV 24		0.613				0.451
MFS-SV 4		0.492				0.541
MFS-SV 15			-0.816			0.684
MFS-SV 17			-0.792			0.687
MFS-SV 13			-0.779			0.669
MFS-SV 3			-0.523			0.506
MFS-SV 7				-0.752		0.728
MFS-SV 10				-0.728		0.819
MFS-SV 23				-0.629		0.655
MFS-SV 19				-0.611		0.674
MFS-SV 21				-0.536		0.468
MFS-SV 1				*-0.396*		0.403
MFS-SV 8	*0.431*				0.487	0.816

3.3 Analysis 2 – Confirmatory Factor Analysis

The three models compared were set up as follows: Model 1 – Five correlated factors, with the item-factor structure of the original questionnaire; Model 2 – Five correlated factors, with item1 loading on the Mutilation latent variable (as suggested by the EFA results); Model 3 – Four correlated factors, with the items of the *Injections & Blood Draws* and the *Blood* sub-scales loading on the same latent variable. Factors were allowed to be correlated, as suggested by the MFS-SV development and validation study (Olatunji et al., 2012). The results indicate that Model 3 is a poor representation of the observed data, while the other two models are more adequate, with slightly better fit indexes for the Model 2. Nevertheless, the differences of the NFI, TLI and CFI indexes of the two models can be considered too small (cut-off $\Delta_{1,2} > |0.10|$) to justify the rejection of Model 1 representing the original structure of the MFS-SV. Model 1 was therefore retained (Figure 1).

Table 3. CFA fit indexes

	NC (df, p)	RMSEA	NFI	TLI	CFI	AIC
Model 1	2.465 (265, 0.000)	0.069	0.856	0.896	0.908	773.276
Model 2	2.347 (265, 0.000)	0.066	0.863	0.905	0.916	741.954
Model 3	3.571 (269, 0.000)	0.092	0.789	0.818	0.837	1072.475
			$\Delta NFI_{1,2}$	$\Delta TLI_{1,2}$	$\Delta CFI_{1,2}$	
Model 1 vs Model 2			-0.07	-0.09	-0.08	

Model 1 – Original structure

Model 2 – item1 on "Mutilation"

Model 3 – four factors

Raykov's composite reliability coefficients (CR) were calculated, showing excellent item-scale consistencies for all the subscales (CR_{INJECT} = 0.90, CR_{SHARP} = 0.84, CR_{EXAMS} =0.87, CR_{BLOOD} = 0.95, CR_{MUTIL} = 0.86).

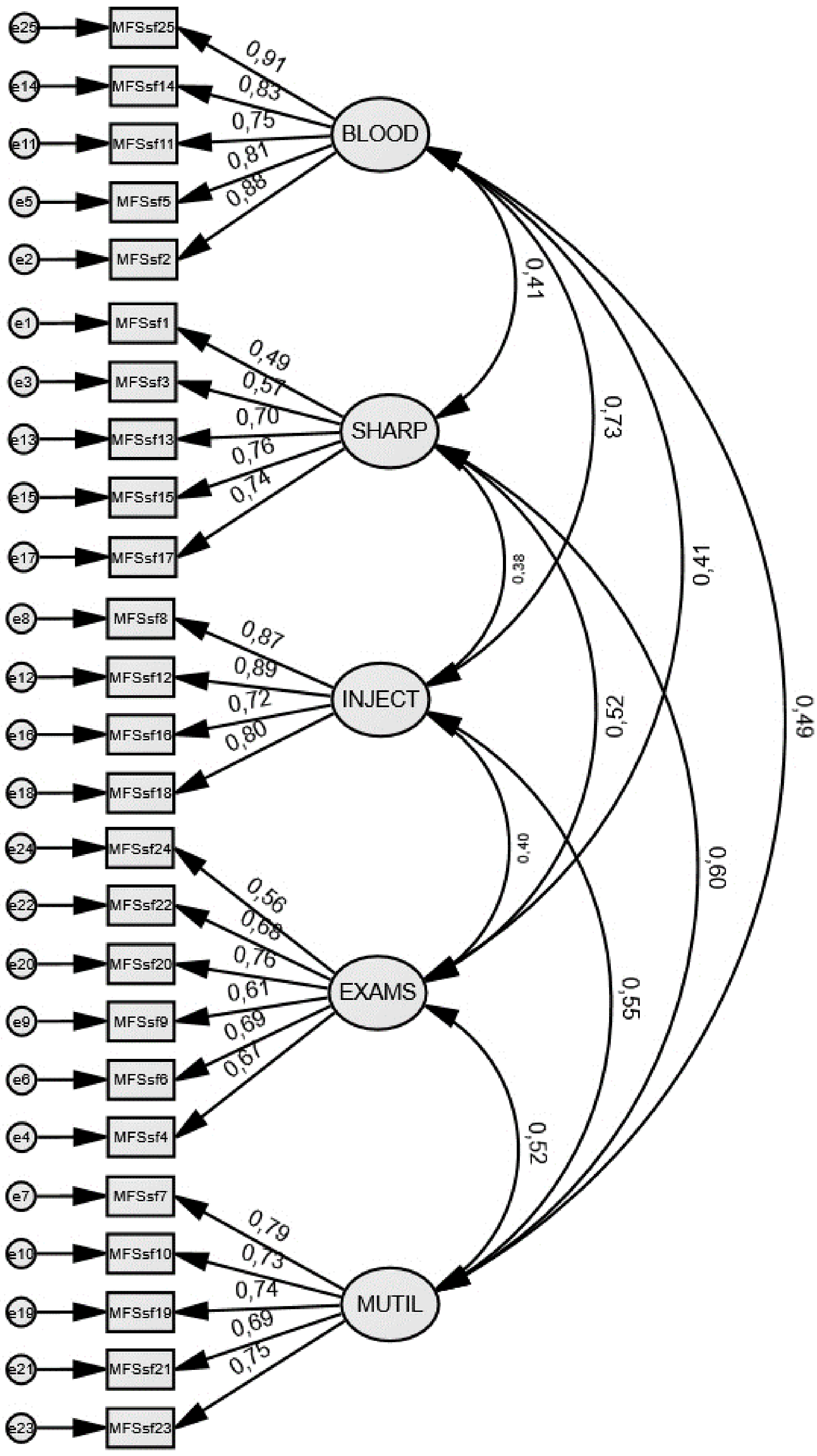

Figure 1. Model 1 representation, with standardized estimated coefficients

3.4 Analysis 3 – Validity, reliability, and test-retest stability of the scores

Zero-order correlations with the IPS-ANX and DPSS-R confirmed the convergent validity of the MFS-SV, while the coefficients with the PI revealed a weak association as expected. Point estimate factor correlations ranged from 0.147 (PI – INJECT) to 0.298 (PI – EXAMS), with all the upper-bound confidence intervals being below the 0.8 cut-off. Test-retest scores revealed a good stability, with intraclass correlation coefficients ranging from 0.810 (*Examinations*) to 0.934 (*Injections & Blood Draws*). Ordinal-Alpha coefficients were also very good, ranging from 0.848 (*Sharp Objects)* to 0.973 (*Blood*). All the validity and reliability results are reported in Appendix 2.

3.5 Analysis 4 – Multigroup invariance

According to the standard procedures, the different types of invariance were assessed in a hierarchical order of robustness, starting from configural invariance. The results of the MGCFA (χ^2 = 2.819, p < 0.001; RMSEA = 0.051; CFI = 0.899 supported the hypothesis of the equivalence of the MSF-SV across the gender groups. Subsequently, item-level metric invariance was tested, constraining all loadings to be equal across groups. Results (χ^2 = 2.752, p < 0.001; RMSEA = 0.050; CFI = 0.899) indicate that the item-construct relations do not significantly differ across groups. The assessment of the structural invariance tested the equivalence of the factorial covariances across the groups, suggesting that the latent structure is the same for both groups (χ^2 = 2.716, p < 0.001; RMSEA = 0.050; CFI = 0.899). The residual variance-invariance assessment also supported the acceptance of the equivalence of the model (χ^2 = 2.639, p < 0.001; RMSEA = 0.049; CFI = 0.900). Finally, full invariance test supported the hypothesis of invariance of MFS-SV across the groups (χ^2 = 2.645, p < 0.001; RMSEA = 0.049; CFI = 0.898). Gender differences in scoring should not be referred to the psychometric properties of the questionnaire.

3.6 Analysis 5 – Predictive validity and DSM-V-based phobia-related questions

To evaluate the predictive validity of the questionnaire a discriminant linear function was built. Results (Wilk's Lambda = 0.915; p < 0.001) supported the hypothesis that the MFS-SV scores could discriminate subjects with a history of blood donations. Predictably, the scores of the *Injections & Blood Draws* scale provided the strongest contribution in discriminating the subjects and the linear function correctly classified the 76,6% of the group cases (Appendix 3).

To further investigate the validity of the MFS-short, we conducted a discriminant analysis using the DSMV-based phobia-related questions on a subsample of 104 participants.

First, four groups were created based on the number of "true" answers (i.e., a score of 0, 1-2, 3-4, 5-6) on the six DSM-V-based phobia-related questions. A total of 14.2% of the respondents (8.1% of men and 15.8% of women) reached a score of 3, while 15.3% (10.9% of men and 16.5% of women) reached a score of 2 and 20.3% (19.6% of men and 20.5% of women) reached a score of 1. Half of the respondents (50.2%) responded (61.4% of men and 47.2% of women) with no to all six questions.

There was a statistically significant linear trend for number of "true" answers (i.e.: phobia-proneness) across all five subscales: IB ($F(1, 2475) = 332$, $p < 0.01$, $\eta p\ 2 = 0.118$), SO ($F(1, 2475) = 99.8$, $p < 0.01$, $\eta p\ 2 = 0.04$), BL ($F(1, 2475) = 248$, $p < 0.01$, $\eta p\ 2 = 0.09$), MU ($F(1, 2475) = 169$, $p < 0.01$, $\eta p\ 2 = 0.06$) and ES ($F (1, 2475) = 245$, $p < 0.01$, $\eta p\ 2 = 0.09$). The significant linear trends indicate that those participants who reported higher number of phobia-related events (i.e., the number of "true" answer) scored higher on the subscales of MFS-short. See Table 4 for the mean scores and 95% confidence interval values of the groups.

4. Discussion

The aim of this study was to validate the Italian version of the MFS-SV and to assess its usability in the context of blood donation.

The Italian translation of the MFS-SV replicated the latent structure of the original short version of the questionnaire in U.S. and Dutch samples (Olatunji et al., 2012) which was also recently replied in the Hungarian validation (Birkás et al., 2021). The EFA results suggested that two of the measured constructs (injection and blood phobias) partially overlapped and consequently the factor structure had to be thoroughly reviewed to evaluate whether the two factors were in fact measuring a single construct. The EFA revealed that item 1 ("Cutting with a hunting knife") could be measuring a different construct (*Mutilations*) rather than the one expected (*Sharp objects*). This is due to the translation of the item that in the Italian version was reported as self-cutting. Accordingly, three models were compared with the CFA (the models specifications and comparison results are reported in Table 2) confirming that the five-correlated factors structure is a better reproduction of the observed data than the four-factor model. The CFA also confirmed that the item1 could be more related to the *Mutilations* sub-scale rather than to the *Sharp Objects* subscale. It has to be noted, however, that the differences between the two models were so small, that the original structure of the questionnaire was retained.

Reliability and validity analysis showed that the Italian version of the MFS-SV had good psychometric properties and test-retest scores stability. Multigroup invariance analyses confirmed the consistency of the scores across gender. Finally, the Italian translation of MFS-

SV showed a good capability in discriminating the scores of individuals with a history of blood donations. This result points promising towards the usage of the MFS-SV (mainly of the Injections and Blood Draws and Blood subscales) as self-administrated tool to detect people at risk for needles and injection anxiety in the context of blood donation and its predictor of blood donor retention. Moreover, the linear association between phobic questions and all five subscales indicated good convergent validity. The robust correlations between the number of positive answers for phobia-related questions and the five domains of MFS-SV suggest that this self-report measure adequately embraces overall vulnerability to medical fears. The examination of the discriminant validity also supported the construct validity: the level of phobia-proneness was predictable based solely on the MFS-short score in more than half of the cases.

Although the Italian translation of MFS-SV was consistent with the original version of the instrument and with its Hungarian validation (Birkás et al., 2021; Olatunji et al., 2010), further research is needed to confirm our study. Given the aims of the questionnaire and its broad range of potential applications, it could be useful to verify its consistency in other populations. It could be interesting to evaluate the association between MFS-SV scoring and individuals' attitudes towards different medical situations such as consultations, invasive and non-invasive testing and screening procedures.

The recent COVID-19 vaccination campaign required a higher attention to vaccination hesitancy and fear of blood and needles is one the key factor to consider; the availability of a validated scale, together with other tools (Malas & Tolsa, 2021), represent an important result.

5. Conclusions

The psychometric properties of the Italian version of the MFS-SV were good and similar to those reported in previous validation work (Birkás et al., 2021; Olatunji et al., 2012). The availability of a shorter, reliable and valid measure to assess medical fears represent an important step in the Italian healthcare context and open to the possibility of cross-cultural studies. MFS-SV can be relevant to both research and clinical practice furthering our understating of medical-related fears and lending support to the implementation of medical fears assessments in vaccine and blood donation area.

6. Limitations and recommendations for future research

This study confirmed the good psychometric properties of the MFS-SV. There are nevertheless issues that needed to be considered. Although the sample was adequate for the aims of this study, it included only university students. Further studies should aim to a wider age range as well as to include clinical populations. Existing literature pointed out that the *Injections & Blood Draws* and the *Blood* subscales discriminate between donors and non–donors (Labus et al., 2000). The discriminant ability of the other subscales should also be explored. Furthermore, medical fears were measured using self-reports bringing subjectivity that may alter results. The inclusion of physiological measures (such as heart rate, blood pressure, previous fainting episodes) could help to overcome this limitation and should be considered in future studies. The availability of a short, valid, and reliable questionnaire can contribute to increase research in medical-related fears with a huge bearing on clinical practice such as vaccine hesitancy and blood donation.

Ethical approval [*] : The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Ethics approval was obtained from the University of Milano-Bicocca Ethics Committee (study Prot. n° 339, 0059772/17).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement [*]: The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any potential conflict of interest.

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Appendix 1. English and Italian wording of the MFS-SV

MFS-SV (English version/Italian version)

The following situations are known to cause some people to experience fear and apprehension. Please rate for each situation listed, how much fear or tension you would experience if you were exposed to that situation at this time. Use the following scale to evaluate each situation and place a mark (X) in the space corresponding to how much fear or tension you would experience in the listed situation.

0 = No fear or concern at all, 1 = Mild fear, 2 = Considerable fear, 3 = Intense fear. (Le situazioni seguenti sono note per causare ad alcune persone paura e apprensione. Per ogni situazione elencata valuta quanta paura o tensione sentiresti se fossi esposto alla situazione in questo momento. Per valutare ogni situazione utilizza una scala da 0 a 3 dove 0=Nessuna paura o preoccupazione, 1=paura lieve, 2=paura considerevole, 3=paura intensa)

How Much Fear or Discomfort Would You Experience From/ Quanta paura o disagio sentiresti nelle seguenti situazioni?:				
1. cutting with a hunting knife/ Tagliarti con un coltello da caccia	0	1	2	3
2. seeing a small vial of your own blood/Vedere una fialetta con il proprio sangue	0	1	2	3
3. observing someone chop with an axe/Osservare qualcuno spaccare in pezzi con un'ascia	0	1	2	3
4. feeling like you will faint/Sentirti come se stessi per svenire	0	1	2	3
5. seeing a small test tube of animal blood/Vedere una piccola provetta di sangue animale	0	1	2	3
6. feeling pains in your chest/Sentire dolori al petto	0	1	2	3
7. observing a surgical amputation/Osservare un’amputazione chirurgica	0	1	2	3
8. receiving a hypodermic injection in the arm/Ricevere un’iniezione ipodermica nel braccio	0	1	2	3
9. having a severe headache/Avere un forte mal di testa	0	1	2	3
10. seeing a mutilated body on TV/Vedere un corpo mutilato in TV	0	1	2	3
11. seeing a small bottle of human blood on TV/Vedere una bottiglietta di sangue umano in TV	0	1	2	3

12. having blood drawn from your arm/Ricevere un prelievo di sangue dal braccio	0	1	2	3
13. observing someone operate a power saw/Osservare qualcuno che utilizza una sega elettrica	0	1	2	3
14. seeing a large bottle of your own blood/Vedere una grande bottiglia del proprio sangue	0	1	2	3
15. handling a butcher knife/Maneggiare un coltello da macellaio	0	1	2	3
16. having a blood sample drawn from your finger tip/Farti prelevare un campione di sangue dalla punta del dito	0	1	2	3
17. handling an open pocket knife/Maneggiare un coltellino tascabile aperto	0	1	2	3
18. seeing someone receiving an injection in the arm/Vedere qualcuno a cui viene fatta un'iniezione nel braccio	0	1	2	3
19. seeing a bleeding wound to a person's eye/Vedere una ferita sanguinante all'occhio di un'altra persona	0	1	2	3
20. feeling your heart race for no obvious reason/Sentire il proprio cuore battere velocemente senza alcuna ragione apparente	0	1	2	3
21. seeing the mutilated body of a dog that had been run over by a car/Vedere il corpo mutilato di un cane che è stato investito da un'auto	0	1	2	3
22. feeling odd tingling in your arm/Sentire uno strano formicolio al braccio	0	1	2	3
23. seeing photos of wounded soldiers from war/Vedere fotografie di soldati feriti in guerra	0	1	2	3
24. feeling nauseated/Provare nausea	0	1	2	3
25. seeing a small vial of human blood/Vedere una fialetta di sangue umano	0	1	2	3

Supplementary Materials:

Appendix 2. MFS-SV validity and reliability

	MFS-SV Injections	MFS-SV Sharp Obj.	MFS-SV Examinations	MFS-SV Blood	MFS-SV Mutilations
Zero-order correlations					
IPS Contact Fear	0.816	0.298	0.343	0.465	0.402
IPS Distal Fear	0.834	0.228	0.331	0.611	0.454
IPS Total	0.895	0.283	0.365	0.588	0.466
DPSRR Total	0.326	0.339	0.490	0.376	0.466
PI Total	0.147	0.249	0.265	0.218	0.225
Point estimate factor correlations (confidence interval upper-bound)					
PI	0.147 (0.257)	0.287 (0.397)	0.298 (0.406)	0.236 (0.340)	0.247 (0.357)
Reliability					
Test-retest ICC	0.934	0.819	0.810	0.894	0.891
Ordinal-Alpha	0.951	0.848	0.866	0.973	0.833

Appendix 3. Mean scores of donors and non-donors