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Fear of flying assessment: A contribution to the Italian validation of two self-report measures

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The present study describes the psychometric properties of the Italian adaptation of two self-report scales for fear of flying assessment: the Flight Anxiety Situations questionnaire (FAS), which measures anxiety related to specific flying phases, and the Flight Anxiety Modality questionnaire (FAM), which focuses on somatic and cognitive modalities occurring in air travel situations. Although both questionnaires have been translated in various languages and tailored to several local frameworks, this is the only study that provides an evaluation of the adapted instruments' validity and reliability. Validation procedures were done on 259 participants, including patients who experienced fear of flying as well as a group of non-clinical subjects. Exploratory factor analysis was used to investigate the optimal design for the dimensional structure of both instruments. Confirmatory analyses showed that the envisaged models provided an acceptable fit for the available data. A three-factor solution for FAS and a two-factor solution for FAM were therefore detected. Construct validity was supported by convergent and criterion-related data, internal consistency was satisfactory for all subscales, and both instruments revealed a high level of sensitivity to change. Overall, psychometric quality of both measures showed to be fairly good and comparable to those found in the original study, thus suggesting their application in treatment programs for non-English speakers.

Key words: fear of flying, FAS, FAM, aerophobia

As stated at the third International Fear of Flying Conference, held at ICAO Headquarters in Montreal, Canada, in November 2007, the last few years have been characterized by a growing request for fear of flying treatments. Although air travel is generally considered as one of the safest types of public transportation, people are still afraid of flying. Recent studies from Italy have revealed that about 50 percent of the adult population is apprehensive of flying (Evangelisti, 2008; Van Gerwen, Diekstra, Arondeus, & Wolfger, 2004). However, such widespread phobia has led to rather few controlled studies of the treatment of flight anxiety, some of which also show methodological problems (Bor & van Gerwen, 2003; Hawton, Salkovskis, Kirk, & Clark, 1991; Van Gerwen, Spinhoven, Diekstra, & Van Dyck, 2006). Moreover, although many self-report instruments have been designed to measure the fear of flying, only a few validation studies have been published (Bornas & Tortella-Feliu, 1995; Haug et al., 1987; Howard, Murphy, & Clarke, 1983; Johnsen & Hugdahl, 1990; Nousi, van Gerwen, & Spinhoven, 2008; Sosa, Capafons, Viña, & Herrero, 1995; Van Gerwen, Spinhoven, Van Dyck, & Diekstra, 1999; Van Gerwen, Van de Wal, Spinhoven, Diekstra, & Van Dyck, 2003), so that most questionnaires included in treatment programs are often adapted from previous research and lacking evaluation of their psychometric properties.

Fear of flying is a specific phobia, i.e., the experience of an unreasonable amount of anxiety regarding a particular object or situation and causing the stimulus to be avoided or endured with indeed intense anxiety. Specific phobias differ from ordinary fears insofar as the distress they cause may lead to daily functioning impairments, such as being unable to maintain a job or social relations (Mogotsi, Kaminer, & Stein, 2000). As regards their etiology, phobias result from an interaction between a disposition to physiologically experience fear and a psychological vulnerability to experience anxiety (Barlow, 2002).

Flight phobia is a heterogeneous phenomenon, with many elements not always being specific to flight: some of them may be related to heights, enclosed spaces, crowded conditions, and not feeling in control. Generally, people who experience fear of flying report three kinds of symptoms: (a) physiological reactions, which include mus-

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cle tension, tremors, heavy breathing, heart palpitations, chest pain, abdominal and intestinal discomfort, sweating, weakness, dizziness, dry mouth, flushed or pale face; (b) psychological reactions, which include impaired memory, narrowed perceptions, poor or clouded judgment, negative expectancies, perseverative thinking; (c) behavioral reactions, which include avoidance (Diagnostic and Statistical Manual of Mental Disorders [DSM-IV]; American Psychiatric Association [APA], 1994). Intensity of fears associated with flying may range from mild or moderate apprehension to a considerable discomfort up to an incapacitating phobia, when the anxiety effects can impede the subject's personal and professional life, namely, resulting in lost productivity and opportunities due to an inability to travel. The consequences, therefore, include career repercussions, as well as social embarrassment and restrictions. Hence, several treatment methods have been envisaged and various programs–consisting of anxiety management instruments, accurate information about airplanes and flying, and exposure techniques–are now available to all those highly motivated to overcome a fear whereby aircrafts may be delayed prior to departure due to last minute avoidance behaviors (Foreman & Van Gerwen, 2008).

The aim of the present study is the validation of the Italian version of two self-report questionnaires for assessing fear of flying: the Flight Anxiety Situations questionnaire (FAS; Van Gerwen et al., 1999), and the Flight Anxiety Modality questionnaire (FAM; Van Gerwen et al., 1999; Nousi et al., 2008). The choice reflects the need for reliable and valid measures respecting fear of flying complexity, as well as some concerns about treatment outcome measures. In this respect, both FAS and FAM have excellent psychometric properties and cover different responses (in terms of behavior, physiology, and cognitions) to flight phobia. Moreover, FAS permits recording the subjects' reactions at various stages of a trip with the airplane, from the preliminary phase (e.g., planning a trip, boarding the plane) to the actual flight. Thus, the mentioned instruments seem helpful in obtaining a detailed assessment of the most relevant phobic stimuli for each examined case.

To this purpose, a sufficient amount of data has been collected on the dimensional structure, reliability, and validity of two English versions of the FAS and FAM inventories, but this information is not available for adapted and translated versions of these instruments. Actually, even though both questionnaires are now widely used in several versions (English, Dutch, Italian, Danish, French, German, Hebrew, Icelandic, Korean, Portuguese, Russian, Spanish, and Swedish), this is the first paper considering the effect of translations on their psychometric properties. Furthermore, as the psychological measures relevant to the fear of flying appear to depend on cultural influences–we have examined the Italian version of FAS and FAM using explorative and confirmatory factor analyses. Cultural differences may indeed have occurred, so, in this study, we have looked for possible evidence that the main structure remains the same as in the original questionnaires–which could provide a sounder basis for international comparisons, at least with the Italian version. A further aim of the paper was to determine whether the Italian measures are suitable to evaluate treatment outcomes.

METHODS

Participants and procedure

Two hundred and fifty-nine participants, 45.2% men and 54.8% women, with a mean age of 39.7 years (SD = 12.92; range = 18-74), were enrolled in this study. The sample included a self-selected group of flight phobics (42.9%), and a non-clinical group (57.1%). Both groups showed many similarities with the subjects included in the study with original instruments in English, in terms of age, gender, and demographic and psychological variables.

The first group was composed of 111 patients who were self-referred to Psychosomatic Diseases Laboratory of Palermo, Italy, because of fear of flying (39.6% men and 60.4% women, with a mean age of 45.7 years, SD = 10.76, range = 24-74). All participants were patients who were afraid to fly and who participated in the assessment phase prior to cognitive-behavioral group treatment. They were interviewed by a trained psychologist who used the Millon Clinical Multiaxial Inventory (MCMI–III; Millon, Millon, & Davis, 1994; Zennaro, Ferracuti, Lang, & Sanavio, 2008), and were found to meet DSM-IV criteria for neurotic diseases, phobia, anxiety, and panic attack (APA, 1994). Exclusion criteria were neurological disorders, posttraumatic stress disorder or acute stress disorder (not related to fear of flying), severe agoraphobia, and a co-morbid psychiatric diagnosis. Subjects were also excluded if: (a) they had suicidal tendencies, (b) they did not want to stabilize their antidepressant medication during the course of treatment, or (c) they were unable to discontinue the use of benzodiazepines. Data were collected in small group sessions before the beginning of the treatment and three months after the treatment. Participants were informed about the aim of the research and a strong emphasis was put on voluntary adhesion and data confidentiality.

The second, non-clinical group consisted of 148 participants, 49.3% men and 50.7% women, with a mean age of 35.2 years (SD = 12.58, range = 18-70). The non-clinical group was recruited in the departure area of the Palermo Falcone-Borsellino airport. Responses to two simple screening questions were used to select people: (a) who were not afraid of flying, and (b) who had not received any training as flying crew or with flying crew. All participants gave written, informed consent before completing FAM and FAS. Unlike patients, they were not submitted to MCMI-III and

Fear Survey Schedule (FSS; Wolpe & Lang, 1977; Zotti, Bertolotti, Michielin, Sanavio, & Vidotto, 1997, for Italian version).

Instruments

During the clinical interview, patients completed the MCMI–III (Zennaro et al., 2008), a widely used clinician-rated measure of personality disorders and Axis I disorders. After back-translation by a native English speaker, two inventories for assessing several aspects related to fear of flying, namely focusing on feelings, attitudes, and cognitions, were administered to all participants:

1. The 32-item FAS questionnaire (Van Gerwen et al., 1999), which measures the level of anxiety produced by specific flying situations. It consists of three subscales: (a) the Generalized Flight Anxiety, referring to anxiety experienced in connection with airplanes in general, regardless of personal involvement in a flight situation (e.g., seeing or hearing planes or taking someone to the airport); (b) the Anticipatory Flight Anxiety, pertaining to anxiety experienced before the actual departure time (e.g., planning a trip, boarding the plane); and (c) the In-Flight Anxiety, concerning anxiety experienced during a flight, from takeoff until landing (e.g., different situations possibly occurring while flying). Respondents were asked to circle the number corresponding to their level of anxiety in the situations mentioned, using a scale from 1 (*no anxiety*) to 5 (*overwhelming anxiety*).

2. The FAM questionnaire (Van Gerwen et al., 1999), which focuses on symptom expressions, such as physiological anxiety responses and thoughts related to the danger of flying. It consists of 18 items structured in two subscales: (a) the Somatic Modality scale, referring to physical symptoms; and (b) the Cognitive Modality scale, pertaining to the presence of distressing cognitions. Here, the respondents were asked to rate the degree of accuracy with which each item described the intensity of their reaction, using a scale from 0 (*not at all*) to 5 (*very intensely*).

In addition to FAM and FAS, the clinical group was administered the "airplanes and journeys by plane" item from FSS (Wolpe & Lang, 1977; Zotti, Bertolotti, Michielin, Sanavio, & Vidotto, 1997, for Italian version). This item–scored on a 5-point Likert scale, ranging from 0 (*none*) to 4 (*very much anxiety*)–was aimed to measure fear of air traveling. According to the procedure followed for questionnaires' construction, fear of airplanes and air travels was chosen as an external variable to be used as a measure of phobic stimulus conceptually related to fear of flying. This choice was also supported by previous studies (Van Gerwen, 2003), according to which fear of flying patients, when responding to FSS, had the highest score on the item "airplanes and journeys by plane". A single-item scale was selected as a criterion in the validation procedure because, at the moment, no other validated multi-item scales for these constructs are available.

Data analyses

Exploratory factor analysis. In order to investigate the underlying dimensional structure of both instruments, exploratory principal axis factor analyses with promax rotation were performed on the whole sample. With the 18-item FAM and the 32-item FAS we were able to satisfy the minimum five participants-per-item ratio, which is usually recommended for factor analysis (Gorsuch, 1983). Prior to exploratory factor analysis, data were inspected to ensure items were significantly correlated, using Bartlett's Test of Sphericity, and that they shared sufficient variance, using KMO's Test of Sampling Adequacy. Moreover, in order to evaluate whether items also shared sufficient variance to justify factor extraction, Kaiser's Test of Sampling Adequacy (MSA) was used (Hair, Anderson, Tatham, & Black, 1995). Both Kaiser's (1961) criterion and the Scree test (Cattell, 1966) were used to set the number of factors. Salience was detected applying the three following item retention criteria to the rotated structure matrix: (a) a factor loading of at least .30 on the primary factor, ensuring a high degree of association between the item and the factor; (b) a difference of .30 between the loading on the primary factor and the loading on other factors, when an item was loaded simultaneously on two factors; and (c) a minimum of three items for each factor, ensuring meaningful interpretation of stable factors (Tabachnick & Fidell, 1996).

Subscales Cronbach's alpha coefficients were calculated. Corrected item-scale correlations were examined for each of the instruments' subscales. Following De Vellis' (1991) suggestions for obtaining a scale measuring relatively specific construct, it was decided that adjusted item-total correlations for each item should exceed .40. In order to investigate the extent to which each questionnaire's factor scores were correlated, we used the Pearson correlation coefficient. Different domains were expected not to be very highly correlated, as an indication that the subscales measured several approaches to fear of flying.

Confirmatory factor analysis. Findings from exploratory factor analyses were then examined in more detail by conducting confirmatory factor analyses on the total sample (N = 259). Confirmatory factor analyses were performed using EQS structural equations modeling program Version 6.1 (Bentler, 2006), and applying maximum likelihood robust estimation procedures. The similarity of the envisaged models with the empirical data was statistically tested through goodness-of-fit indexes. The Satorra-Bentler chi-square (S-B χ^2) was not used as an evaluation of absolute fit because of its sensitivity to sample size. Therefore, as a reference, we used the ratio of chi-square to degrees of freedom

(χ^2/df), the Non-Normed Fit Index (NNFI), and the Robust Comparative Fit Index (RCFI). Moreover, we applied the Root Mean Square Error of Approximation (RMSEA) to provide an indication of the global fit of the model and the Standardized Root Mean Square Residual (SRMR) to indicate the standardized average absolute difference between the original and reproduced matrices. Confirmatory factor analyses were performed with each latent construct predicting its proposed manifest indicators selected on the basis of the results of the exploratory factor analyses described above. All latent constructs were allowed to intercorrelate freely since we expected them to be significantly correlated with each other. Each variable was allowed to load only on one factor, and one variable loading in each factor was fixed to 1.0. The remaining factor loadings and residual variances were freely estimated.

Relations to other variables (external criterion). The relationship between scores on both questionnaires and the relevant flying item in the FSS was explored. Two-tailed correlations were computed between the FAM and FAS subscales (N = 259), and between the questionnaires' subscales and the "airplanes and journeys by plane" item from FSS (n = 111).

Multigroup comparisons. An analysis of means comparison, computed with an independent samples t-test, was performed to determine whether there was any evidence that the average scores of the two groups were different. Moreover, to evaluate the degree of change, Cohen's d effect sizes between groups were calculated. For the purpose of interpretation, according to Cohen's conventional criteria, d = 0.20 is considered to be a small effect, d = 0.50 is considered to be a medium effect, and d = 0.80 is considered to be a large effect.

Sensitivity to change. Fifty-one patients (52.9% male and 47.1% female, with a mean age of 45.25 years, SD = 10.64) from the clinical group were re-tested to assess sensitivity to change in the FAS and FAM scales. They were participants who were available to continue the assessment programme. Evidence that this subsample is not different from the whole clinical sample with regard to fear of flying is provided. Based on independent t-test results, no mean differences were found between groups in the following measures: Total Score (FAM): $t(160) = -0.86$, $p = .391$, Somatic Modality (FAM): $t(160) = -1.59$, $p = .113$; Cognitive Modality (FAM): $t(160) = 0.50$, $p = .616$; Total Score (FAS): $t(160) = -0.71$, $p = .481$; Anticipatory Flight Anxiety (FAS): $t(160) = -1.17$, $p = .245$; In-Flight Anxiety (FAS): $t(160) = -0.51$, $p = .613$; Generalized Flight Anxiety (FAS): $t(160) = 0.49$, $p = .626$.

We analyzed differences in pre-treatment measurements during the assessment phase and follow-up measurements three months after treatment on the FAS and FAM with paired t-tests. Moreover, to evaluate the degree of change, we calculated Cohen's d effect sizes within groups.

RESULTS

Exploratory factor analysis. The Sampling Adequacy (Kaiser-Meyer-Olkin) resulted in .96 with respect to FAM and .97 concerning FAS. Bartlett's Test of Sphericity was significant (p = .001) in both cases, indicating that both questionnaires' items were appropriate for a factor analysis (Kaiser, 1974). The Kaiser-Guttman's criterion and the inspection of the scree plots suggested extracting two factors for the FAM and three factors for the FAS. The factor correlation matrix, indicating a prominent intercorrelation among factor scales, supported the use of the oblique rotations procedures (promax criterion). Based on the resultant pattern matrix, four items that loaded simultaneously on two factors with a difference lower than .30 between the loading on the primary factor and the loading on other factors were not retained. In particular, item 5 ("I feel palpitations of the heart or a quicker heartbeat")–which loaded stronger on Cognitive Modality subscale rather than on Somatic Modality subscale as expected–was deleted from FAM; item 13 ("You hear the sound/noises of jet engines", loading simultaneously on In-Flight Anxiety subscale and Generalized Flight Anxiety subscale), item 19 ("You are informed of the flight safety regulations by the cabin crew") and item 20 ("The takeoff is announced")–which loaded simultaneously on Anticipatory Flight Anxiety subscale and In-Flight Anxiety subscale–were removed from FAS. Except for the suppressed items, no different item-to-factor correspondences were revealed. Compared to original version, number of factors and item contents was unvaried, with only some light variation in loadings. Items and factor loadings of the 17-item FAM are shown in Table 1. The factor solution of the 29-item FAS is shown in Table 2. Correlation between FAM factors was .737, and FAS factor correlation matrix is reported in Table 3. All subscales alpha coefficients can be considered excellent (from α = .90 to α = .99). High Cronbach's alpha coefficients may raise the question on the content of items. High inter-item correlations could be a consequence of redundant repetition of the same information in the items. Nevertheless, also supported by discussions with patients and experts, we decided to maintain all the items because they are judged to enable sampling of different behaviors across a wide spectrum of expressions. High alpha values are probably understandable when considering the measured construct indicators, which are typically highly intercorrelated (e.g., physiological phobic symptoms are rarely experienced singularly).

Both questionnaires' subscales factorial scores were strongly correlated, ranging from .65 to .88 (p < .01, two-tailed tests; see Table 4). Both our findings and the outcomes of scale construction process are essentially in the same direction, with higher strength of calculated correlations in this study rather than in the original research (from $r = .32$, $p \leq .017$ to $r = .66$, $p \leq .000$).

Factor structure stability across the two subsamples was tested performing separate exploratory factor analyses. In

Table 1
Factor loadings of the Flight Anxiety Modality Questionnaire items (pattern matrix)

Item	SM	CM
13. I am short of breath	.920	
14. I have the feeling that I am going to choke	.892	
3. I feel pain in the region of my chest	.866	
18. I think that I will faint from fear	.858	
11. I feel dizzy or I have the feeling that I am going to faint	.838	
12. My limbs are tense and cramped, so I feel the urge to move or walk	.787	
15. I have a dry mouth	.751	
17. I feel suddenly warm or cold	.693	
1. I notice numbness in my limbs	.612	
7. The tension makes me clumsy and things fall out of my hands	.573	
9. I attend to every sound or movement of the plane and wonder whether everything is fine		.969
10. I continuously pay attention to the faces and behavior of the cabin crew		.930
2. I have a fear of dying		.882
6. The idea that something will go wrong is constantly in my mind		.862
8. I can't concentrate because I am preoccupied with thoughts about horrible flight situations		.815
16. I think the particular plane I am on will crash		.666
4. I can't tell what is going to happen and that makes me feel very anxious		.552
% variance	37.86	33.12
Cronbach's alpha	.95	.95

Note. SM = Somatic Modality; CM = Cognitive Modality.

Table 2
Factor loadings of the Flight Anxiety Situations Questionnaire items (pattern matrix)

Item	I-FA	AFA	GFA
24. The plane banks left or right	.961		
25. The wings of the plane are moving, shaking	.924		
28. The plane starts the descent	.920		
30. You are shaken	.881		
31. The sound of the engine gets louder again	.857		
27. The sound of the engines decreases	.836		
29. Air turbulence is announced	.817		
23. You hear some noises during the flight	.811		
22. You are pushed back into your seat	.760		
32. The landing is announced	.733		
21. The engines give full power before takeoff	.653		
26. The cockpit informs you of the actual altitude or flight-level	.577		
9. You enter the departure hall		.945	
11. You are waiting for the boarding call		.937	
15. You are going through the security check		.918	
16. You are going through the gate		.911	
8. You are on the way to the airport		.897	
14. You are walking in the direction of the gate		.893	
10. You are going through customs for a passport check		.887	
7. You buy a ticket		.802	
17. You enter the flight cabin		.767	
18. The doors are being closed		.694	
6. You decide to take a plane		.651	
1. You see an airplane			.848
5. Friends tell you about a flight			.750
2. You hear the sounds of planes			.737
3. You read a report about a flight			.735
4. You bring someone to the airport			.699
12. You see planes taking off and landing			.673
% variance	32.08	30.38	17.40
Cronbach's alpha	.90	.99	.98

Note. I-FA = In-Flight Anxiety; AFA = Anticipatory Flight Anxiety; GFA = Generalized Flight Anxiety.

both groups, results revealed a structure similar to that underlying the full data set. Factors remained essentially invariant and items loaded in substantially the same way. The differences emerging in the solutions consisted merely of small changes in the relative order of some of the items.

Confirmatory factor analysis. With respect to the FAM, because the chi-square test is biased by sample size and the number of variables and degrees of freedom, the statistically significant chi-square value for the model was not surprising. The indexes seemed to indicate that the envisaged factor structures were plausible: Satorra-Bentler chi-square (116) = 231.15 (p < .001; χ^2/df = 1.99), NNFI = .95, CFI = .96; RMSEA = .06 (90% CI [.050, .073]), SRMR = .05. Figure 1 shows the conventions of path diagrams.

Table 3
Factor correlation matrix of the Flight Anxiety Situations Questionnaire

Factors	FAS I-FA	FAS AFA
FAS AFA	.820	–
FAS GFA	.635	.647

Note. I-FA = In-Flight Anxiety; AFA = Anticipatory Flight Anxiety; GFA = Generalized Flight Anxiety.

With regard to the FAS, the confirmatory factor analysis showed the reasonable goodness-of-fit for a three-factor model, indicating an acceptable fit for the model: Satorra-Bentler scaled (χ^2 = 872.91; p < .001; χ^2/df = 2.35), NNFI = .96, CFI = .96, RMSEA = .07 (90% CI [.066, .078]), and SRMR = .04. Figure 2 shows the standardized parameter estimates.

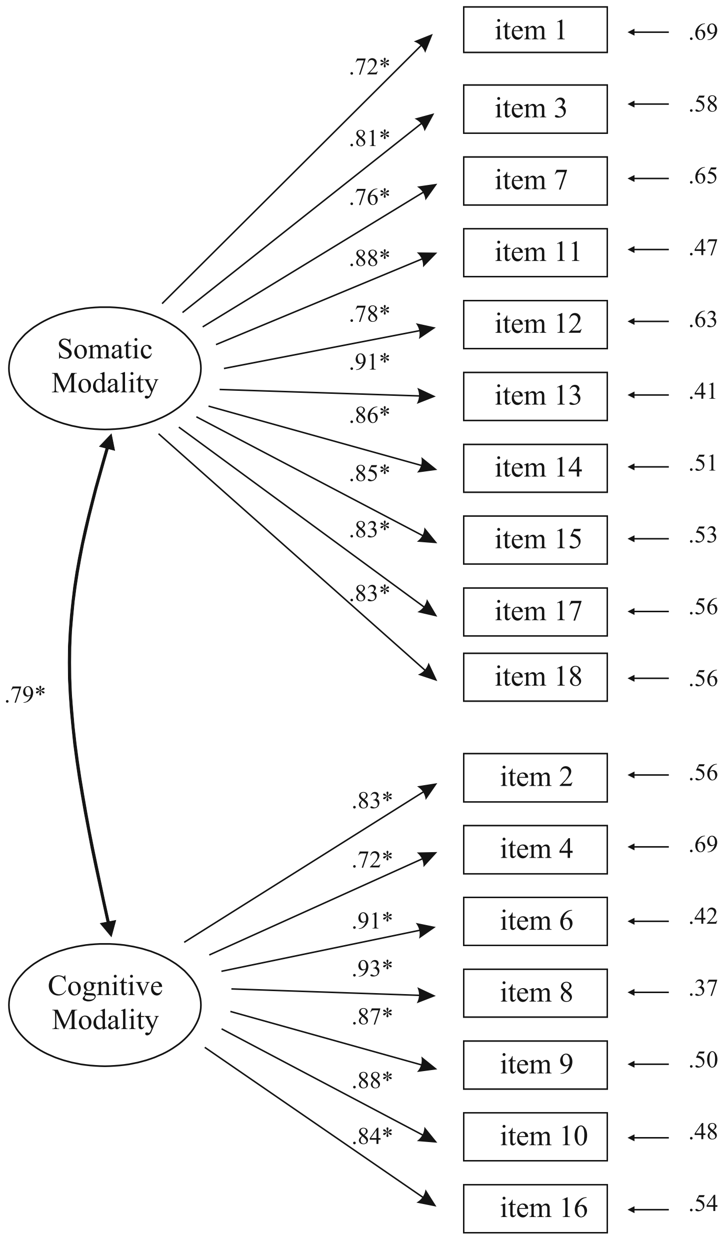

Figure 1. Flight Anxiety Modality (FAM) empirical model (standardized solution).
* $p < .05$.

According to the results of confirmatory factor analysis, the latent factors are strongly correlated to each other. However, we decided to retain the presented solutions, which was supported by two reasons: (a) the general high associations between factors–the In-Flight Anxiety factor and Anticipatory Flight Anxiety factor share 74% of common variance–is understandable because of the unavoidable conceptual connection of the questionnaires' subscales, also found in the original study; and (b) a more parsimonious solution is judged to hinder a detailed assessment of fear of flying with consequential loss of salient information.

FAS and FAM subscales were highly intercorrelated (see table 4). The FAS In-Flight Anxiety and Anticipatory Flight Anxiety are especially closely related to the FAM Cognitive Modality (respectively $r = .88$ and $r = .86$, $p < .01$). This is probably due to the fact that both subscales are specifically related to the anxiety one is afraid to experience during the flight. The other highest correlation is between FAS An-

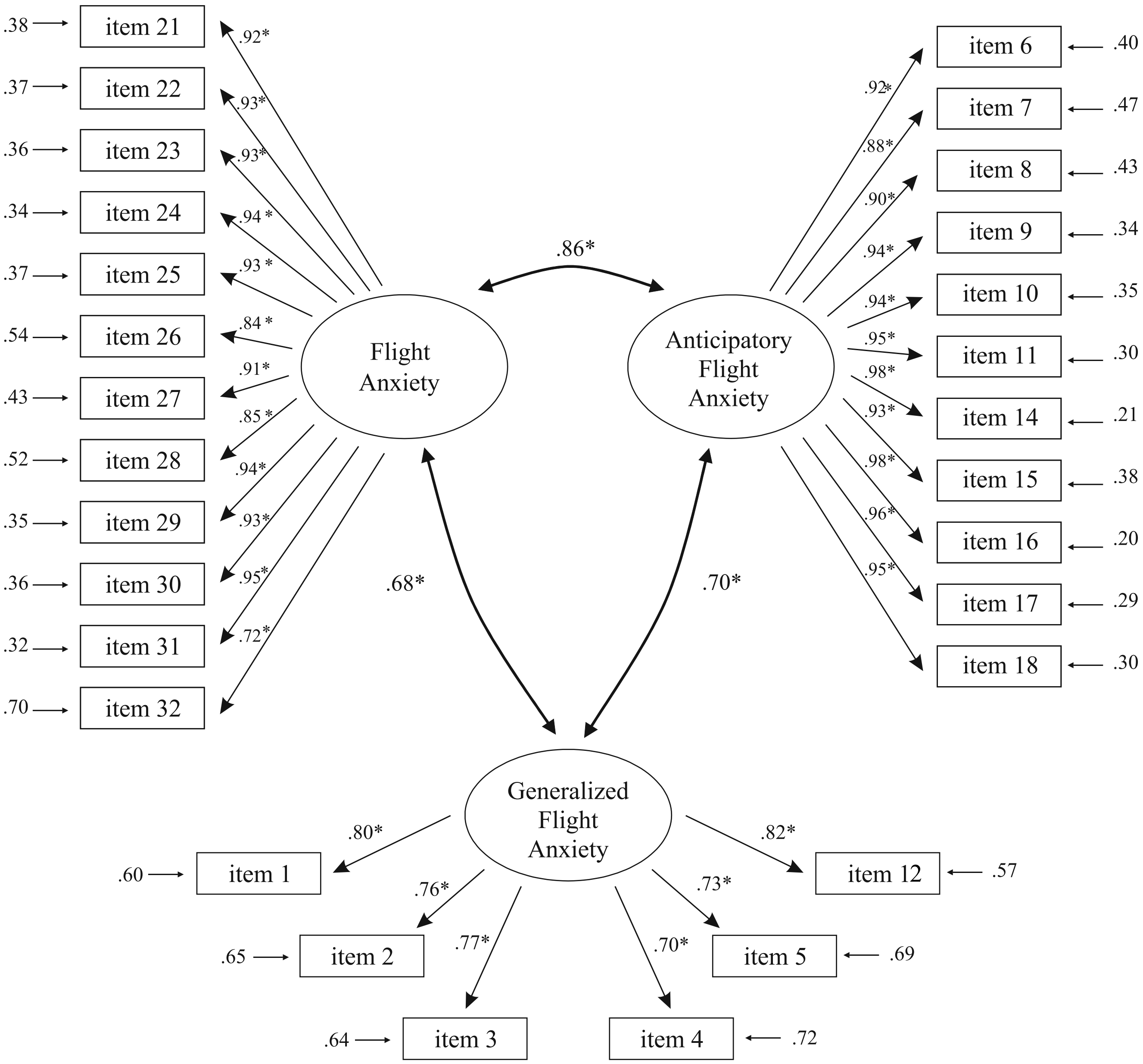

Figure 2. In-Flight Anxiety Situations (FAS) empirical model (standardized solution).
* $p < .05$.

ticipatory Anxiety and FAS In-Flight Anxiety (r = .79, p < .01). In fact, generally, it is expected that when anticipatory anxiety is high, in-flight anxiety will also be high. Correlation patterns for both samples appear substantially similar to the trends in the whole group of participants, with stronger values in the non-clinical sample rather than in the clinical one. The "airplanes and journeys by plane" item on the FSS shows significant association with the FAS and FAM subscales, suggesting sufficient convergent validity, with moderate to strong correlations ranging from .26 to .47, p < .01. Range restriction corrections were also calculated using Gulliksen's formula.

As regards criterion validity, the performed analysis shows that the two subsamples differ massively. A very marked difference between scores from each group can be detected on all scales in the predicted direction. Differences have a very high effect size too (Cohen's d ranged between 1.35 and 2.51). Results are reported in Table 5.

Table 4
Correlations between the Flight Anxiety Modality (FAM) and Flight Anxiety Situations (FAS) subscales and the "airplanes and journeys by plane" item from the Fear Survey Schedule (FSS)

	FAS AFA	FAS I-FA	FAS GFA	FAM SM	FAM CM
FAS AFA	–	.794**	.659**	.721**	.857**
FAS I-FA	.598** (C) .585** (NC)	–	.647**	.678**	.882**
FAS GFA	.363** (C) .616** (NC)	.401** (C) .585** (NC)	–	.531**	.654**
FAM SM	.453** (C) .516** (NC)	.402** (C) .521** (NC)	.219* (C) .524** (NC)	–	.757**
FAM CM	.572** (C) .745** (NC)	.707** (C) .783** (NC)	.395** (C) .568** (NC)	.529** (C) .681** (NC)	–
FSS Airplanes item	.473** (C) .613** (RRC)	.414** (C) .574** (RRC)	.257** (C) .223** (RRC)	.280** (C) .263** (RRC)	.438** (C) .536** (RRC)

Note. Intercorrelations for the whole sample (N = 259) are presented above the diagonal, and intercorrelations for the clinical (C; n = 111) and non-clinical (NC; n =148) subsample are presented below the diagonal. AFA = Anticipatory Flight Anxiety; I-FA = In-Flight Anxiety; GFA = Generalized Flight Anxiety; SM = Somatic Modality; CM = Cognitive Modality; RRC = Range restriction correction.
* p < .05 (2-tailed). ** p < .01 (2-tailed).

Table 5
Mean scores on the Flight Anxiety Modality (FAM) and Flight Anxiety Situations (FAS) subscales obtained for clinical and non-clinical group

	Patients		Other participants			
	M	*SD*	*M*	*SD*	t value	Cohen's d
FAM SM	24.59	10.62	11.92	4.38	13.11	1.56
FAM CM	24.73	6.99	10.99	5.28	18.02	2.06
FAM Total Score	49.32	15.50	22.91	8.86	17.30	1.95
FAS AFA	41.68	10.98	15.52	7.65	22.60	2.51
FAS I-FA	47.05	10.64	22.59	11.37	17.62	2.04
FAS GFA	12.20	5.26	7.02	1.97	11.01	1.35
FAS Total Score	100.94	22.09	45.13	19.53	21.51	2.27

Note. All t values are significant at p < .001. SM = Somatic Modality; CM = Cognitive Modality; AFA = Anticipatory Flight Anxiety; I-FA = In-Flight Anxiety; GFA = Generalized Flight Anxiety.

Sensitivity to change. Table 6 shows that the FAS and FAM scales seem to be sensitive to treatment intervention. On all scales, the difference between pre- and post-treatment scores has a very high effect size (Cohen's d ranged from 1.21 to 1.62).

Table 6
Mean scores on the Flight Anxiety Modality (FAM) and Flight Anxiety Situations (FAS) subscales at pre- and post-treatment

	Pre-treatment		Post-treatment			
	M	SD	M	SD	t value	Cohen's d
FAM SM	21.86	8.87	13.62	4.95	5.75	1.27
FAM CM	25.31	6.58	15.51	6.74	7.43	1.57
FAM Total Score	46.18	12.82	28.06	10.78	7.68	1.57
FAS AFA	39.53	10.78	24.39	10.63	7.14	1.53
FAS I-FA	46.14	10.85	29.06	13.16	7.15	1.56
FAS GFA	12.63	5.08	8.35	2.77	5.28	1.21
FAS Total Score	98.29	22.13	61.80	24.35	7.92	1.62

Note. All t values are significant at p < .001. SM = Somatic Modality; CM = Cognitive Modality; AFA = Anticipatory Flight Anxiety; I-FA = In-Flight Anxiety; GFA = Generalized Flight Anxiety.

CONCLUSIONS

The present paper aimed at proving the validity of the Italian version of two self-report instruments for measuring different aspects of fear of flying: the FAS, concerning anxiety produced by several air-travel situations, and the FAM, referring to the modalities of the expression of anxiety. According to our findings, both adapted questionnaires have promising psychometric characteristics. First of all, the Italian FAS and FAM appear to be essentially equivalent to the original questionnaires. Exploratory factor analyses highlighted the expected dimensional structures, suggesting that flight anxiety concerns several situations connected with air travel, and two clear-cut modalities for expressing phobic stimuli, i.e. cognitions connected to the danger of flying, and somatic symptoms manifested while flying. FAS and FAM dimensions' intercorrelations were strong, thus providing evidence for convergent validity. Besides, reliability analyses showed excellent results for each subscale. The confirmatory factor analyses assessed the adequacy of the proposed questionnaires' structure solutions and the relationships among the latent variables. In both cases, results from exploratory factor analyses were replicated, thereby giving more evidence for the postulated dimensional structures. Verified models appeared as an acceptable description of the data, gathering evidence for the construct validity of adapted questionnaires. Thus, it can be concluded that three and two factors, for FAS and FAM respectively, can be distinguished.

In order to check that FAM and FAS measured what they were supposed to, the patterns of relationship between their subscales and the "airplanes and journeys by plane" item from FSS were investigated. This provided convergent validity support for the two self-report questionnaires, even if using only one item of the FSS as a measure of convergent validity presents a weakness of this study. Further evidence refers to criterion-related validity: according to initial hypotheses, patients involved in the research obtained significantly higher FAS and FAM scores than other participants. Sensitivity to change in measuring treatment outcomes was examined analyzing differences in questionnaires' scores between pre-treatment assessment and follow-up measurements, showing that the above outcomes could have a bearing on clinical practice. All results were very similar to those obtained for the original instruments (Van Gerwen et al., 1999). Although several versions of the FAS and FAM questionnaires have been produced, this is the first study investigating the effects of their translation on the psychometric properties and concluding that factorial structures of both measures resemble those of original questionnaires – a relevant element for international comparisons between studies.

All the findings reported in the present paper support the possible application of both instruments to fear of flying assessment. However, as it is well known, the process of testing an instrument never ends: a measure is incessantly validated as data become available to recommend its use for the purpose for which it was designed. Future empirical research and theoretical developments, therefore, are needed to support psychometric adequacy of the FAS and FAM. Namely, concurrent validity must be further investigated using additional tests and groups of participants, discriminant validity must be examined in order to verify that the two instruments do not show appreciable correlations with other scales to which they are theoretically unrelated, the factor structure reliability must be confirmed by replications with independent samples, and temporal stability should be further investigated.

Moreover, although the number of participants ensured adequate analysis of the data, rather low generalization to the relevant population should be considered as a major drawback of this study. Actually, due to the absence of a casual sampling, external validity has not been achieved. With a view to guarantee that results are considered as valid not only for the specific group investigated, future studies will benefit from the adoption of probability sampling methods.

In conclusion, the study demonstrates the psychometric properties of the Italian FAS and FAM, suggesting that they may be helpful in measuring different aspects of fear of flying. The adapted scales may be mainly useful in the clinical practice for the evaluation of the effectiveness of a training program on flight anxiety. In particular, FAS and FAM may be supportive in measuring differential treatment effects on specific aspects of phobic disorders. Both questionnaires could, thus, be recommended as research instruments for evaluating treatment outcomes over the behavioral responses to aerophobia. Indeed, measuring only behavioral avoidance can be misleading because many phobic people do not completely avoid the feared stimulus. Therefore, the studied measures may help achieve as comprehensive as possible descriptions of a complex phenomenon like fear of flying.

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