Blood-injection Phobia Inventory (BIPI): Development, reliability and validity

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Abstract: The aim of this study was to develop the Blood-Injection Phobia Inventory (BIPI) and thus provide a valid and reliable assessment instrument for measuring blood anxiety and blood phobia in Spanish population. This study examined the psychometric properties of the BIPI in 174 Spanish-speaking subjects. The BIPI is a self-administered questionnaire of 18 items or stimulus content and 27 phobic responses that can be used on a 4-point Likert-type format. The scale had a Cronbach’s alpha of .98 and showed good concurrent, convergent, and discriminant validity. Factor analysis of the BIPI identified one significant factor, suggesting that blood phobia is a unitary psychometric construct. This factor explained 76% of stimulus content and 74% of phobic responses of the total variance. Results of this study suggest that the BIPI has adequate psychometric properties that make it a valid and reliable instrument to assess blood phobia in Spanish-speaking individuals.

Keywords: Blood anxiety; construction; validation; Blood-Injection Phobia Inventory; Spanish-speaking subjects; instrumental study.

Introduction

Over the last decades, research on treatment efficacy of the approach of specific phobias has undergone an interesting development (Choy, Fyer, & Lipsitz, 2007). All the controlled studies with in vivo exposure in the treatment of people with phobias have shown that it is effective to reduce subjective anxiety and avoidance behaviors in phobics (Ost, Alm, Branderg, & Breitholz, 2001; Walder, McCracken, Herbert, James, & Brewitt, 1987; Williams, Dooseman, & Kleinfield, 1984).

Cognitive factors are considered an important component of anxiety. Phobic beliefs, such as an irrational fear of the possible danger of the stimuli, play an important role in specific phobias (Thorpe & Salkovskis, 1995), but only recently has been acknowledged the cognitive therapy as a treatment modality. There are no follow-up studies of cognitive therapy in blood phobia.

In parallel to the study of the different treatment modalities of blood phobia, diverse assessment measurements have been designed. A review of the literature shows that there are various types, depending on the characteristics of the instruments. The first questionnaires elaborated in the 1960-70s are general and measure a limited number of contexts associated with fears and phobias. For example, the Fear Survey Schedule FSS-III (Wolpe & Lang, 1964, 1977) assesses distress in 72 different phobic situations (being alone, automobiles, injuries, diseases, birds, etc.). The Fear Questionnaire (FQ; Marks & Mathews, 1979) assesses avoidance in 15 situations (agoraphobia, social anxiety, and blood phobia), the degree of concern and difficulty produced in the person’s life.

Since the 1970s, specific instruments were developed to identify situations related to blood phobia, for example, injections, injuries, or medical or dental examinations. The Mutilation Questionnaire (MQ; Klorman, Weerts, Hastings, Melamed, & Lang, 1974) is a 30-item true/false scale that assesses the cognitive component when facing stimuli related to injuries, cuts, deformities, organs, or mutilations. The Medical Fear Survey (MFS; Kleinnecht, 1991), from the decade of the 1990s, has 70 items and measures the degree of fear in situations related to fear of medical aspects, for example, blood, hypodermic needles, or physical symptoms. The Medical Avoidance Survey (MAS; Kleinnecht, Thorndike, & Wolls, 1996) is made up of 21 items and evaluates the avoidance of treatments or the anticipation of the consequences. The Blood-Injection Symptom Scale (BISS; Page, Bennet, Carter, Smith, & Woodmore, 1997) has 17 items and measures the presence of physical symptoms when facing situations involving blood or injections. Although the MQ, the MFS, the MAS, and the BISS show more specificity than the FQ and the FSS-III, the main limitation of these instruments is only assess blood phobic’s some situations.

Recently, the Multidimensional Blood/Injury Phobia Inventory (MBPI; Wenzel & Holt, 2003) was designed. It comprises 40 items and assesses in four types of stimuli (injections, hospitals, blood, and injuries) the presence/absence of five types of coping responses (fear, avoidance, worry, distress, and fainting), with both a self versus other focus. This instrument has good psychometric properties and characterizes the totally of blood phobia.
Although there are several measurements to assess blood/injection phobia, no instrument adapted to the Spanish population with similar characteristics as the MBPI has been designed. The Blood-Injection Phobia Inventory (BIPI) comprises 18 situations involving blood and injections. It assesses in vivo anxiety and anticipatory anxiety in three types of responses (cognitive, physiological, and behavioral), with the phobic stimulus affecting oneself or other persons.

This instrumental study (Carretero-Dios & Pérez, 2007) has three goals. In the first place, we explored the psychometric characteristics of the BIPI. For reliability we used Cronbach’s alpha coefficient and for convergent validity we used Pearson’s correlation coefficient, both from BIPI. The discriminant validity was obtained from the same correlation coefficient, using the FQ and the BIPI.

We used a sample from the general population to examine whether this instrument discriminates between people diagnosed with blood-injection-injury phobia (according to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (American Psychiatric Association, 1994) from people without this phobia. In the second stage, we determined whether blood phobia is a one-dimensional construct. We included stimuli related to different specific phobias (injuries, injections, and medical interventions) and different types of responses (cognitive, physiological, and behavioral). In the third time, we examined whether the BIPI is a sensitive instrument to evaluate the therapeutic change in people diagnosed with blood-injection-injury phobia according to the DSM-IV (APA, 1994). For all participants, treatment consisted of six group sessions of exposure in vivo. One of the two groups was treated with applied tension (exposure in vivo + tension technique).

Method

Participants

The sample was made up of two groups of participants: (a) a clinical sample comprising 39 patients, 30 female (77.5%), diagnosed with specific phobia, blood-injection-injury type, according to the criteria of the DSM-IV (APA, 1994), by means of the Structured Clinical Interview for DSM-III-R (SCID, Spitzer & Williams, 1987) and not affected by any other kind of phobia or anxiety disorder, aged between 15 and 30 years (M = 23.73, SD = 3.49). Participants completed the Fear Questionnaire (Marks & Mathews, 1979) (M FQ-Blood/Injection = 20.26, SD = 8.96). Of the sample, 82.5% were married and 64.15% had a degree or higher education; (b) a normal sample of 135 people selected (Spain). All the participants were from the Region of Andalusia (Spain).

In order to determine the characteristics of blood phobia in the clinical sample, we elaborated an interview with specific information: gender, age, age at onset disorder and presence of family history (yes/no). Furthermore, it was assessed on a scale with five response options the interference of blood phobia at the time of interview: the presence of episodes of fainting (from never to always), the perceived ability/capacity to control the problem (from nothing at all) the degree of disability in everyday life (from nothing to total). Finally, information was obtained about past and present medical, psychological and psychopharmacological treatments received because of any mental disorder, especially related to blood phobia, or health-related complications.

In 72.1%, the problem had appeared in childhood, and in 46%, there were direct family antecedents with blood-injury phobia. Regarding the degree of impairment or interference in daily life, a notably high percentage (86.1%) reported that the phobia caused them pretty much/a lot of impairment. Moreover, 70.8% of the clinical sample reported having low capacity of self-control. And in almost one half of the blood phobics, fainting behavior was present, with a frequency of sometimes/always.

People who, after medical examination, presented certain medical complications (i.e., coronary problems or neurological injuries) and people who reported having suffered or suffering some psychopathological disorder —except for blood phobia—and/or who were receiving psychopharmacological or psychological treatment were excluded from the study.

Assessment Instruments

Fear Questionnaire (FQ) (Marks & Mathews, 1979). This is a self-report designed to measure agoraphobic fear, social anxiety, and blood-injection-injury type phobia. The first part has 15 items that measure the degree to which the person avoids each situation on a 9-point Likert scale, ranging from 0 (I don't avoid it) to 8 (I always avoid it). The subscale of blood/injury phobia is made up of 5 items about blood and/or injuries (range: 0 - 40 points). The second part of the questionnaire allows subjects to appraise the concern caused by certain symptoms or thoughts and the current state of their phobic symptoms, anxiety and depression conjointly as well as the global appraisal of the impairment produced by the phobia.

The first part of the FQ has been shown to have high internal consistency, as well as being a reliable and valid measurement to discriminate agoraphobia from social phobia (Cox, Swinson, & Shaw, 1991). In the Spanish adaptation (Sandín, Valiente, & Chorot, 1999), the internal consistency alpha coefficients of this questionnaire were: .78 (FQ total), .75 (blood-injections-injuries), .64 (social anxiety) and .55 (agoraphobia).
This instrument has good test-retest reliability ($r = .96$ for blood phobia and physical injuries). The subscale of blood phobia has been used as a measure of convergent validity and the subscales of social anxiety and agoraphobic fear as a measure of discriminant validity.

**Blood-Injection Phobia Inventory (BIPI).** This was specifically designed to assess fear of blood. In its preliminary version (see Appendix 1), it had 50 items about diverse situations preferably related to blood, injections, and the dentist (32 situations) and, to a lesser degree, animal blood (5 situations) and the color red (4 situations) to check whether produce similar phobic symptoms, agoraphobia (5 situations), and social anxiety (4 situations). It measures the frequency of symptoms on a 4-point scale ranging from 0 (never) to 3 (always), of the patient’s different types of responses (cognitive, physiological, and behavioral), and also appraises both “situational anxiety” and “anticipatory anxiety” responses (see Appendix 1). It developed from a review of the literature of the subject and the clinical experience of researchers. The proposed version in this paper is showed in the Appendix 2.

**Procedure**

The clinical sample was obtained by means of the mass media (radio and press). In the information provided, we alluded to the research being carried out from the University and the possibility of participating in the study by receiving free psychological treatment. Likewise, we specified the problem, its characteristics, the goals we hoped to achieve, and we included a contact phone number. After the telephone conversation, we scheduled the first appointment for an individual interview. In the interview, we collected the personal data, the person’s history, etc. Subsequently, in a second session, we proceeded with the assessment and the diagnosis, according to the criteria of the DSM-IV (APA, 1994) of specific phobia, subtype blood-injections-injuries. Before beginning the assessment of the participants, we provided information about the investigation, we clarified all their doubts, and they provided written informed consent. They were informed that their participation was voluntary and they could leave the study whenever they wanted to without having to offer any explanations.

To obtain the sample population, we requested the collaboration of the associates and colleagues of the research team who had some knowledge of psychology studies (second-cycle students and/or postgraduates). They were responsible for recruiting people between 15 and 30 years. We used the criterion of contact with nine people in the general population of the same age and sex for each participant, so that the composition in terms of these variables were similar for both samples. Recovering rate of self reports was 54%.

They were informed about the goal of the investigation, the aim of the use of the inventory and, particularly, about the procedure to evaluate the test (response options, situations it comprised, and symptomatology in the triple response system). Along with this information and after signing the Informed Consent, they were given a series of concrete instructions (i.e., self-application) to homogenize the procedure to be followed and to ensure the rigor of the investigation as much as possible.

Each instrument was identified with a code, the age, and gender, as well as other descriptive data (studies/profession, place or residence, etc.), the same characteristics as those to be considered in the clinical sample.

**Construction of the Blood-Injection Phobia Inventory (BIPI)**

**a) Situations**

**Descriptive statistic characteristics.** The first criterion used to select the situations was that they had to discriminate statistically between the normal group and the phobic group. Of the 50 situations included initially, only 40 provided statistically different means ($p < .05$) between the groups. We eliminated the following items: the agoraphobic situations 1, 28, 46, and 50; the situations related to social anxiety 3 and 43; three of the four situations that referred to the color red (situations 10, 16, and 27), and one situation (number 17) of the five that referred to animal blood (see Table 1).

**b) Symptoms**

**Descriptive statistic characteristics.** To determine the power of discrimination of each of the symptoms of the three types of response, as the first criterion, we proceeded to compare the mean scores of both groups. Out of 32 symptoms, 31 discriminated; in contrast, 1 of the 12 cognitive responses (L symptoms “I think I’m going mad”) did not yield any differences between the normal sample and the blood phobics (see Table 2).

**Results**

**Exploratory factor analysis of the situations of the BIPI**

Exploratory factor analysis with principal components and varimax rotation was applied to the 40 situations resulting from applying the above-mentioned criterion. We used Kaiser’s criterion (eigenvalues higher than 1) to retain factors and we selected only the items with loadings over .50 (see Table 3). Using this criterion, we eliminated another four situations: 11, 14, 24, and 44.
When I see a report or documentary film about animals or a bull-fight on TV and I think of the
46. When I go to a soccer field or to some public spectacle.
45. When I think that if I go to the dentist for a filling or to get a tooth pulled out, they will have to
44. When I think that the color dark red looks like blood.
43. When they invite me to eat at a restaurant with other people.
42. When I describe to another person an experience or situation involving blood.
41. If I open a meat wrapping and it is smeared with animal blood.
40. While I’m in the dentist’s waiting-room.
39. When I think about having to get a blood test.
38. When I see a pool of blood on the floor.
37. When I think of the color red.
36. When I think about having to attend a relative (child, parent) to clean or cure a bleeding wound.
35. When the dentist’s nurse cleans blood from my mouth with cotton or gauze.
34. If I see an operation or surgical intervention.
33. When I think that the nurse has to insert the needle in my vein to extract my blood.
32. When I describe to another person an experience or situation involving blood.
31. If I go into the butcher’s shop and I see the butcher with his apron spotted with blood.
30. When I see the dentist before the intervention (mask, gown, gloves).
29. When I see a bloody wound or cut.
28. When I am in an elevator.
27. When I see the color red in a picture or poster.
26. When I get local anesthesia.
25. When I see another person getting an intramuscular injection.
24. When I have to accompany a relative to have a blood test or to cure an open wound.
23. If I open a meat wrapping and it is smeared with animal blood.
22. While I’m in the dentist’s waiting-room.
21. When I think that I have to accompany a relative to have a blood test or to cure an open wound.
20. When I hear a conversation about blood.
19. When I see the dentist’s drill going into my mouth.
18. When I see a laboratory tube with blood.
17. In a restaurant, when I observe that a piece of meat on the plate is “bloody”.
16. When I think of the color red.
15. When I notice an ad about the proper use of hypodermic needles (without considering the possi-
14. When I have to accompany a relative to have a blood test or to cure an open wound.
13. When I see the needle go into the vein of my arm to extract blood.
12. When I notice the smell and see the dentist’s instruments ready for a dental intervention.
11. When I notice the smell and see the dentist’s instruments ready for a dental intervention.
10. When going to buy a present or clothing and they offer me something red.
9. When having to clean a wound or cut on bloody skin.
8. If I’m in the kitchen and I see a knife with blood on it after cutting meat.
7. When I get an intravenous injection.
6. When I feel discomfort in my mouth and think about having to go to the dentist, without consid-
5. When going to the dentist for a check-up.
4. When going to the dentist for a check-up.
3. In a group of friends or coworkers, when they ask my opinion.
2. When I see an injured person after an accident, bleeding in the road or on TV.
1. When I walk along the beach or in the mountains.
(j) I get pale.
(l) I think I shall go mad.
(j) I must get out of here before I make a fool of myself.
(i) I think I’m going to faint.
(c) My mind goes blank.
(b) I think that “something bad is going to happen to me.”
(e) I shift around in my seat nervously, etc.
(d) I escape from the situation immediately.
(m) I feel stomach discomfort.
(f) I feel a cold sweat all over my body.
(c) My muscles start to tense.
(f) I feel a cold sweat all over my body.
(g) I feel more blood pumping in my body.
(b) I feel my face is hot.
(i) I lose consciousness.
(j) I get pale.
(k) I faint.
(l) I feel a lump in my throat.
(m) I feel stomach discomfort.

<table>
<thead>
<tr>
<th>Symptoms (rank: 0-150)</th>
<th>Normal (n=135)</th>
<th>Blood phobics (n=39)</th>
<th>Value of Contrast Statistic</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>I don’t think I will be able to bear the situation.</td>
<td>1.51</td>
<td>2.51</td>
<td>10.87</td>
<td>8.40</td>
</tr>
<tr>
<td>I think that “something bad is going to happen to me.”</td>
<td>.56</td>
<td>1.57</td>
<td>5.87</td>
<td>8.35</td>
</tr>
<tr>
<td>My mind goes blank.</td>
<td>.66</td>
<td>2.13</td>
<td>4.51</td>
<td>6.88</td>
</tr>
<tr>
<td>I perceive that not much time will go by before I get dizzy.</td>
<td>.82</td>
<td>1.79</td>
<td>12.589</td>
<td>9.70</td>
</tr>
<tr>
<td>I feel confused, disoriented.</td>
<td>1.42</td>
<td>2.25</td>
<td>9.66</td>
<td>9.80</td>
</tr>
<tr>
<td>I think people will notice how distressed I feel.</td>
<td>1.33</td>
<td>2.72</td>
<td>8.76</td>
<td>9.63</td>
</tr>
<tr>
<td>I don’t think I’ll know how to react.</td>
<td>.80</td>
<td>1.94</td>
<td>9.76</td>
<td>9.11</td>
</tr>
<tr>
<td>I remember past experiences and anticipate panic.</td>
<td>.86</td>
<td>2.31</td>
<td>11.10</td>
<td>11.03</td>
</tr>
<tr>
<td>I think I’m going to faint.</td>
<td>.45</td>
<td>1.47</td>
<td>9.51</td>
<td>9.83</td>
</tr>
<tr>
<td>I must get out of here before I make a fool of myself.</td>
<td>.33</td>
<td>1.45</td>
<td>7.87</td>
<td>10.52</td>
</tr>
<tr>
<td>I think I should have avoided the situation, because this feeling is nothing new to me.</td>
<td>.77</td>
<td>2.23</td>
<td>10.38</td>
<td>9.62</td>
</tr>
<tr>
<td>I think I shall go mad.</td>
<td>.13</td>
<td>.81</td>
<td>1.35</td>
<td>5.03</td>
</tr>
</tbody>
</table>

Physiological responses
(a) My heartbeat speeds up. 5.46 6.70 26.66 12.58 -10.112 <.001
(b) My palms or armpits sweat. 3.08 6.29 18.10 15.61 -5.868 <.001
(c) My muscles start to tense. 3.04 4.66 11.66 10.34 -5.061 <.001
(d) I feel that I am getting dizzy. 1.69 3.97 17.89 13.08 -7.629 <.001
(e) I breathe more quickly. 3.34 5.49 19.58 14.13 -7.027 <.001
(f) I feel a cold sweat all over my body. 1.57 2.49 9.56 8.94 -5.515 <.001
(g) I feel more blood pumping in my body. 1.91 3.92 11.82 11.46 -5.310 <.001
(h) I feel my face is hot. .96 2.12 5.84 7.90 -3.820 <.001
(i) I lose consciousness. .11 .61 4.17 6.15 -4.117 <.001
(j) I get pale. 2.00 4.08 16.76 13.96 -6.524 <.001
(k) I faint. .28 1.40 7.89 10.43 -4.544 <.001
(l) I feel a lump in my throat. 2.05 2.83 10.20 9.98 -5.038 <.001
(m) I feel stomach discomfort. 1.82 3.38 12.10 12.74 -4.989 <.001

Behavioral responses
(a) I avoid going. I avoid it. 3.05 4.69 16.64 9.457 -8.671 <.001
(b) I am paralyzed and cannot move. 1.23 2.74 4.40 4.68 -4.032 <.001
(c) My legs and/or hands shake. 1.98 3.53 11.92 10.334 -5.906 <.001
(d) I escape from the situation immediately. 1.55 3.39 12.48 10.417 -6.455 <.001
(e) I shift around in my seat nervously, etc. 1.37 3.18 12.48 11.341 -6.053 <.001
(f) My words don’t come out fluently or my voice is uneven. 1.56 3.97 14.43 14.576 -5.457 <.001
(g) I keep quiet, speechless. 1.91 3.92 11.82 11.46 -5.310 <.001

Σ Total responses 69.77 83.91 537.76 349.13 -7.354 <.001

Table 3: Items included in the rotated factor solution of BIPI.

<table>
<thead>
<tr>
<th>Original Situations</th>
<th>Components</th>
<th>Final Situations</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>.800</td>
<td>.425</td>
<td>.944</td>
</tr>
<tr>
<td>13. When I feel the needle go into the vein of my arm to extract blood.</td>
<td>21(/6). When I think that I have to accompany a relative to have a blood test or to cure an open wound.</td>
<td>.922</td>
<td></td>
</tr>
<tr>
<td>39. When I think about having to get a blood test.</td>
<td>.796</td>
<td>.466</td>
<td>.918</td>
</tr>
<tr>
<td>33. When I think that the nurse has to insert the needle in my vein to extract my blood.</td>
<td>.780</td>
<td>.478</td>
<td>.886</td>
</tr>
<tr>
<td>47. When I think of the possibility of donating blood for a relative or friend.</td>
<td>.776</td>
<td>.460</td>
<td>.880</td>
</tr>
<tr>
<td>7. When I get an intravenous injection.</td>
<td>.758</td>
<td>.456</td>
<td>.880</td>
</tr>
<tr>
<td>21. When I think that I have to accompany a relative to have a blood test or to cure an open wound.</td>
<td>.742</td>
<td>.434</td>
<td>.342</td>
</tr>
<tr>
<td>25. When I see another person getting an intramuscular injection.</td>
<td>.713</td>
<td>.440</td>
<td>.386</td>
</tr>
</tbody>
</table>
42. When I think about having to have local anesthesia for a minor intervention. .698 .551
41/15. When I think that, if I go to the emergency ward of a hospital, I may see a stretcher with blood on the sheet. .879
47/17. When I think of the possibility of donating blood for a relative or friend. .873
37/12. When I see a pool of blood on the floor. .871
29. When I see a bloody wound or cut. .660 .319
4/16. When I think about having to have local anesthesia for a minor intervention. .851
34. If I see an operation or surgical intervention. .640 .367
2/18. When I see a laboratory tube with blood. .863
41. When I think that, if I go to the emergency ward of a hospital, I may see a stretcher with blood on the sheet. .857
42. When I think about having to have local anesthesia for a minor intervention. .851
36. When I think about having to attend a relative (child, parent) to clean or cure a bleeding wound. .847
5. When I see blood on my arm or finger after pricking myself with a needle. .609 .420
38. When I go into a hospital. .605 .406
23. If I open a meat wrapping and it is smeared with animal blood. .864
8. If I’m in the kitchen and I see a knife with blood on it after cutting meat. .830
31. If I go into the butcher’s shop and I see the butcher with his apron spotted with blood. .824
49. When I see a report or documentary film about animals or a bull-fight on TV and I think of the possibility of seeing a bleeding animal. .820
32. When I describe to another person an experience or situation involving blood. .460 .308
37. When I see a pool of blood on the floor. .571 .396
18. When I see a laboratory tube with blood. .574 .372
40. When I see a TV or newspaper report involving blood. .520 .343
48. When, after bumping my nose, I think might get a nosebleed. .557 .657
15. When I notice an ad about the proper use of hypodermic needles (without considering the possibility of contagion). .410 .449
2. When I see an injured person after an accident, bleeding in the road or on TV. .491 .352
4. When going to the dentist for a check-up. .892
30. When I see the dentist before the intervention (mask, gown, gloves). .302 .868
6. When I feel discomfort in my mouth and think about having to go to the dentist, without considering the possibility of pain. .863
19. When I see the dentist’s drill foing into my mouth. .314 .852
22. While I’m in the dentist’s waiting-room. .376 .842
12. When I notice the smell and see the dentist’s instruments ready for a dental intervention. .374 .838
45. When I think that if I go to the dentist for a filling or to get a tooth pulled out, the will have to give me an injection in my gum and I will bleed (without considering the possibility of pain). .423 .804
26. When I get local anesthesia. .619 .648
35. When the dentist’s nurse cleans blood from my mouth with cotton or gauze. .426 .575

Note: ( ) Number that appear in the proposed version
Note: Extraction method: principal component analysis, rotation method: Varimax normalization with Kaiser, the rotation converged at 6 iterations.
The adequacy of factor analysis was assessed by three indexes: KMO (.94), the determinant of the correlation matrix (2.56 × 10^{-13}), and Bartlett’s sphericity test, $\chi^2 (153) = 4933.8, p < .001$. All of them yielded values that indicated that factor analysis was appropriate.

As the first factor explained 69% of the variance, a sufficient quantity to consider the instrument one-dimensional, we carried out a one-dimensional factor analysis with the 27 situations that are displayed in Table 3. For the fit of the factor solution, we used the following indexes: the non-normed fit index (NNFI, Bentler & Bonnett, 1980), the comparative fit index (CFI, Bentler, 1989), the value of the goodness-of-fit index (GFI), and the adjusted goodness of fit index (AGFI), Kelly’s criterion (Lorenzo-Seva & Ferrando, 2006), and the root mean square of residuals (RMSR, Bentler, 1995). The model was considered acceptable if it met the criteria RMSR < .08 (Hu & Bentler, 1999); GFI, AGFI, CFI, and NNFI > .90.

In addition to the former global fit indexes, we refined the instrument, progressively eliminating the situations whose standardized residuals were beyond the range (-2.58, 2.58). The standardized residuals refer to the differences between the observed correlations and those estimated by the factor solution. After applying this latter criterion, 18 situations remained, which are shown in Appendix 2.

As seen in Table 3, which shows the one-dimensional model, the goodness-of-fit indexes indicate that the fit of the model was adequate, $\chi^2 (324) = 2061.33, p < .001$; GFI = .99, AGFI = 1.00, CFI = .75, NNFI = .73, Kelly’s criterion = .076; RMSR = .049. The range of smallest and largest standardized residual was (-1.62, 2.14). There are 27 symptoms that constitute a single factor of “symptoms in blood phobia” that explained 74% of the variance.

### Psychometric properties

#### Reliability

The internal consistency index of the inventory, obtained with Cronbach’s alpha coefficient, was .98 in the total sample of participants (normal and blood phobics, $N = 174$), for both the symptoms and the situations. The reliability or internal homogeneity coefficient, obtained by means of the method of Guttman’s split halves with the entire sample of participants, was .98, and the Pearson coefficient between both halves was .96.

#### Validity

The convergent validity among response types, assessed by the correlation both in the sample of normal participants and in the blood phobics, indicates that the cognitive, physiological, and behavioral responses are significantly associated with each other in the measurements of the BIPI and that this association is higher in the sample of blood phobics (see Table 5).
nitive, physiological, and behavioral responses and the total BIPI score of the responses given by the sample of the 39 blood phobic participants, in-

Discriminant validity, obtained using the agoraphobia subscale and the fear subscale of the social situations of the FQ (Marks & Mathews, 1979) shows nonsignificant correlations, indicating that the BIPI measures a different construct from agoraphobia and/or social anxiety.

Convergent validity with other instruments, assessed with the subscale of blood phobia of the FQ (Marks & Mathews, 1979) and the three response types of the BIPI obtained from the sample of blood phobic participants, indicates a significant correlation between the cognitive responses ($r = .59, p < .001$), the physiological responses ($r = .56, p < .001$), and the behavioral responses ($r = .55, p < .001$) with the blood phobia subscale of the FQ, respectively.

Sensitivity to change, appraised by comparative analysis of the responses given by the sample of the 39 blood phobic participants before and after the treatment, indicates that the BIPI discriminates between pre and post-treatment responses and therefore serves to detect therapeutic change in blood phobia, $t(37) = 8.45, p = .001$ ($M_{pret} = 536.76, SD = 347.13; M_{post} = 137.28, SD = 173.80$).

Diagnostic efficacy of the BIPI

The diverse dimensions of the self-report discriminate well between the normal and the blood phobic samples. In fact, it correctly classified 92.5% of the participants, so the value of the diagnostic efficacy of the BIPI is high. Moreover, it has a specificity of 97.1%, and a sensitivity of 76.9% (see Table 6). The proposed cut-off point for the global inventory, corresponding to percentile 75 in the normal sample, is 95 points.
The single factor, extracted with principal component analysis, whether blood phobia is a one-dimensional construct. The second goal was to determine, by exploratory factorial analysis, whether blood phobia is a one-dimensional construct. The single factor, extracted with principal component analysis, for situations and phobic symptoms explained 76% and 74% of the variance, respectively. These results suggest that blood phobia is a unitary psychometric construct and that it adequately taps a broad array of phobic contexts and symptoms that configure the severity of the specific phobia in individuals with blood phobia.

The good convergent validity of the responses indicates that the inventory is a one-dimensional measurement of this subtype of phobia that satisfactorily assesses blood phobia. In contrast, most of the other instruments, such as, for example, the MBPI, are multidimensional. In this case, the first factor -blood phobia- of the six factors yielded by the factor solution explained 42.5% of the total variance (Wenzel & Holt, 2003).

In contrast to other instruments, the inventory integrates symptoms proceeding from the three response types (cognitive, physiological, and behavioral). It reflects the most notable characteristic of blood phobia, the predisposition to vasovagal syncope, which is a biphasic physiological response in this phobia. It identifies individuals with fainting episodes and the relation of such episodes with the rest of the symptoms of the vasovagal syncope. Various investigators have offered diverse explanations of this dysfunction in the last few years (Accurso et al, 2001; Gerlach et al, 2006).

Two relevant characteristics that are derived from the BIPI are that it separates phobic symptoms involving one’s own blood from that of other people’s blood. Moreover, it also distinguishes the individual’s cognitive, physiological, and behavioral symptoms in phobic contexts and the cognitive, physiological, and behavioral symptoms when anticipating future exposure to phobic stimuli. In other words, it allows the appraisal of the severity of the 27 symptoms in the 18 phobic contexts. Despite that the factor analysis suggests that blood phobia is a unitary phenomenon (Borda, 2001), the variability of the clinical profiles indicates that it would be very useful to assess the particular profile of each person for successful treatment.

Lastly, the third goal of the study was to determine whether it is an efficacious tool to detect therapeutic improvement in blood phobias. The BIPI is sensitive to therapeutic change, as it discriminates between responses before and after treatment in people diagnosed with blood phobia. Of the 39 patients who were treated with in vivo exposure, 19 were also trained in the technique of applied tension. After treatment, the BIPI scores indicated a notable change in the severity of the blood phobia. The improvement was detected by the self-report (Borda et al, 1997; Borda et al, 1998).

In conclusion, as noted by Marks & Mathews (1979), a valid instrument to assess treatment success should adequately measure the globality of the specific characteristics of the clinical samples with this subtype of phobia. In this sense, the BIPI meets this need satisfactorily. It responds to an unidimensional construct and it integrates the current phobic behaviors, the physical symptoms, and the thoughts present in blood-related contexts.

As limitations of the study included the age range of the composition of the sample, with a predominance of women, in order to generalization of the results.

Table 6: Diagnostic efficacy of the BIPI (N = 174).

<table>
<thead>
<tr>
<th>Observed groups</th>
<th>Normal</th>
<th>Blood phobics</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>131</td>
<td>4 (2.9%)</td>
<td>135</td>
</tr>
<tr>
<td>(97.1%)</td>
<td>30 (76.9%)</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Blood phobics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>True positives /total patients x 100 = 161 / 174 x 100 = 92.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specificity</td>
<td>100 = 161 / 174 x 100 = 92.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostic efficacy</td>
<td>Total correctly classified /total global x 100 = 92.52</td>
<td></td>
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</tbody>
</table>

Discussion

Diverse instruments have been used in studies of the efficacy of the assessment and psychological treatment of blood phobia. The first questionnaires elaborated, such as the FQ and the FSS-III, are general, and measure a limited number of contexts associated with fears and phobias. Other instruments focus on identifying specific situations related to blood (MQ, MFS, MAS, and BISS). Whereas these assessment measurements do not reflect the totality of blood phobia, the MBPI is a multidimensional inventory that assesses four types of stimuli (injections, hospitals, blood, and injuries) and the presence of five kinds of response (fear, avoidance, worry, distress, and fainting). The BIPI, a self-report measure with similar characteristics to the MBPI, was elaborated to assess the severity of phobic symptoms in certain contexts or when facing situations involving blood, injections, and injuries.

The first goal of this study is to explore the psychometric characteristics of the BIPI. As mentioned, in order to validate the instrument, we used participants from the general population residing in the Region of Andalusia (Spain). It is, therefore, the first inventory elaborated in the Spanish language and adapted to the Spanish population.

The results revealed that it has excellent reliability and internal consistency, as well as good convergent validity with the subscale of blood phobia of the FQ (Marks & Mathews, 1979), the most frequently used inventory. The BIPI discriminates individuals who meet the criterion of specific phobia, subtype blood/injury phobia, from individuals with other types of fears such as social phobia and agoraphobia. It does not correlate significantly with these FQ subscales, thus indicating that blood phobia is a measure of a specific fear with different characteristics from other phobias. Moreover, it presents adequate sensitivity, good specificity, and diagnostic efficacy. It discriminates satisfactorily between blood phobics/nonphobics.

The second goal was to determine, by exploratory factorial analysis, whether blood phobia is a one-dimensional construct. The single factor, extracted with principal component analysis, for situations and phobic symptoms explained 76% and 74% of the variance, respectively. These results suggest that blood phobia is a unitary psychometric construct and that it adequately taps a broad array of phobic contexts and symptoms that configure the severity of the specific phobia in individuals with blood phobia. The good convergent validity of the responses indicates that the inventory is a one-dimensional measurement of this subtype of phobia that satisfactorily assesses blood phobia. In contrast, most of the other instruments, such as, for example, the MBPI, are multidimensional. In this case, the first factor -blood phobia- of the six factors yielded by the factor solution explained 42.5% of the total variance (Wenzel & Holt, 2003).

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As limitations of the study included the age range of the composition of the sample, with a predominance of women, in order to generalization of the results.
References


( Artículo recibido: 7-7-2009; revisado: 10-11-09; aceptado: 26-11-2009)
## Appendix 1: Development of the 50 preliminary situations and measurement of each item

<table>
<thead>
<tr>
<th>Blood</th>
<th>Injection</th>
<th>Dentist</th>
<th>Animal blood</th>
<th>Color red</th>
<th>Agoraphobia</th>
<th>Social anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
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</tbody>
</table>

1. When I walk along the beach or in the mountains

2. When I see an injured person after an accident, bleeding in the road or on TV.

3. In a group of friends or coworkers, when they ask my opinion.

4. When going to the dentist for a check-up.

5. When I see blood on my arm or finger after pricking myself with a needle.

6. When I feel discomfort in my mouth and think about having to go to the dentist, without considering the possibility of pain.

7. When I get an intravenous injection.

8. If I'm in the kitchen and I see a knife with blood on it after cutting meat.

9. When having to clean a wound or cut on bloody skin.

10. When going to buy a present or clothing and they offer me something red.

11. In a party with acquaintances when I have to join the conversation.

12. When I notice the smell and see the dentist's instruments ready for a dental intervention.

13. When I feel the needle go into the vein of my arm to extract blood.

14. When I have to talk in front of a group of people.

15. When I notice an ad about the proper use of hypodermic needles (without considering the possibility of contagion).

16. When I think of the color red.

17. In a restaurant, when I observe that a piece of meat on the plate is "bloody".

18. When I see a laboratory tube with blood.

19. When I see the dentist's drill going into my mouth.

20. When I hear a conversation about blood.

21. When I think that I have to accompany a relative to have a blood test or to cure an open wound.

22. While I'm in the dentist's waiting room.

23. If I open a meat wrapping and it is smeared with animal blood.

24. When I see a laboratory tube with blood.

25. When I think of the possibility of donating blood for a relative or friend.

26. When I go to a soccer field or to some public spectacle.

27. When I notice the possibility of donating blood for a relative or friend.

28. When I think of the color dark red looks like blood.

29. When the color dark red looks like blood.

30. When I go into the elevator.

31. When I think that, if I go to the emergency ward of a hospital, I may see a stretcher with blood on the sheet.

32. When I go to a soccer field or to some public spectacle.

33. When I think that the color dark red looks like blood.

34. When I think of the possibility of donating blood for a relative or friend.

35. When I hear a conversation about blood.

36. When I think about having to have local anesthesia for a minor intervention.

37. When I see a pool of blood on the floor.

38. When I go into a hospital.

39. When I think about having to get a blood test.

40. When I see a TV or newspaper report involving blood.

41. When I think that, if I go to the emergency ward of a hospital, I may see a stretcher with blood on the sheet.

42. When I think that, if I go to the emergency ward of a hospital, I may see a stretcher with blood on the sheet.

43. When they invite me to eat at a restaurant with other people.

44. When I think that the color dark red looks like blood.

45. When I think that I have to accompany a relative to have a blood test or to cure an open wound.

46. When I think about having to have local anesthesia for a minor intervention.

47. When I think about having to have local anesthesia for a minor intervention.

48. When, after bumping my nose, I think I might get a nosebleed.

49. When I see a report or documentary film about animals or a bull-fight on TV and I think of the possibility of seeing a bleeding animal.

50. When I get onto a bus or train.

### Notes:

1. Situational anxiety
2. Anticipatory anxiety
3. Situations that appear in the proposed version.
Appendix 2: Items of the proposed version of the BIPI

In next page you have a list of situations where you can find yourself and that could create distress, tension, etc. to you. The objective is to evaluate the different reactions that occur to you in each of the described situations.

The task is to rate from 0 to 3, the frequency of each symptom. Use the following scale:

3 = Always  
2 = Almost always  
1 = Sometimes  
0 = Never

The procedure is the following: Read each of the situations shown on the left side, and then score from 0 to 3 each symptom that is listed in the top of the page.

Apéndice 2: Items en la versión definitiva del BIPI

A continuación, se le presenta un listado de situaciones en las que Vd puede encontrarse y que podrían suscitarle malestar, tensión, etc. El objetivo es valorar las diferentes reacciones que se producen en Vd. ante cada una de las situaciones expuestas.

La tarea consiste en puntuar de 0 a 3 la frecuencia de cada uno de los síntomas. Utilice la siguiente escala:

3 = Siempre  
2 = Casi siempre  
1 = A veces  
0 = Nunca

El procedimiento a seguir es el siguiente: Lea cada una de las situaciones que aparecen en la parte izquierda y, a continuación, púntue de 0 a 3 cada síntoma que se indica en la parte superior de la página.
<table>
<thead>
<tr>
<th>Total</th>
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<tr>
<td>C. Cambios en apetito</td>
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<tr>
<td>F. Sensación de cansancio</td>
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<tr>
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Blood-injection Phobia Inventory (BIP): Development, reliability and validity

<table>
<thead>
<tr>
<th>Item</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Blood injection is frightening.</td>
</tr>
<tr>
<td>2.</td>
<td>I feel anxious when blood is injected.</td>
</tr>
<tr>
<td>4.</td>
<td>I experience strong fear when blood is injected.</td>
</tr>
<tr>
<td>5.</td>
<td>Blood injections make me feel tense.</td>
</tr>
<tr>
<td>6.</td>
<td>I feel physically ill when blood is injected.</td>
</tr>
<tr>
<td>7.</td>
<td>Blood injections make me feel physically uncomfortable.</td>
</tr>
<tr>
<td>8.</td>
<td>I feel anxious when I see blood.</td>
</tr>
<tr>
<td>10.</td>
<td>I experience strong fear when I see blood.</td>
</tr>
</tbody>
</table>

**Total Score:**

**Scores:**
- 1 to 3: Low level of blood-injection phobia
- 4 to 7: Moderate level of blood-injection phobia
- 8 to 11: High level of blood-injection phobia

**References:**