PHOBIC DIMENSIONS: III. FACTOR ANALYTIC APPROACHES TO THE STUDY OF COMMON PHOBIC FEARS; AN UPDATED REVIEW OF FINDINGS OBTAINED WITH ADULT SUBJECTS

Willem A. Arrindell,1* Mary J. Pickersgill,2 Harald Merckelbach,3 Angélique M. Ardon,1 and Frieda C. Cornet1

1University of Groningen, Department of Clinical Psychology, Academic Hospital, P.O. Box 616, 9700 RB Groningen, The Netherlands
2University of London, Royal Holloway and Bedford New College, Department of Psychology, Egham Hill, Egham, Surrey TW20 0EX, U.K.
3University of Limburg, Department of Mental Health Sciences, P. O. Box 616, 6200 MD Maastricht, The Netherlands

Abstract — Findings from factor analytic studies of self-assessed fears are important for theoretical reasons and for clinical and applied practice. The present review gives a survey of some 38 studies published between 1957 and 1990 that were concerned with analyses of the self-ratings of adult Ss on multi-item measures of fear (Fear Survey Schedules). The question of central importance was whether, on the basis of the studies surveyed, there would be any evidence of the emergence of a general descriptive model of self-assessed fears. The studies were carried out in 12 different countries, with samples comprising either students, other community Ss, or psychiatric patients, non-institutionalized phobic club members, or a combination of these two groups. Based on previous reviews and data, four a priori major classes of fears were defined: (I) Interpersonal events or situations, (II) Death, injuries, illness, blood and surgical procedures, (III) Animals, and (IV) Agoraphobic fears. In addition, a subsidiary category was used for classifying dimensions falling outside the scope of the a priori categories. Leaving unreliable studies aside, a total of 194 factors were identified in 25 studies: 62 (32%) type I, 88 (45.2%) type II, 31 (16%) type III and 27 (13.9%) type IV dimensions, with only 16 factors (8.2%) falling in the residual category. All 25 studies were able to identify one or more type I or type II dimensions of fear; 88% yielded one or two Animal factors, while three out of four (75%) produced one or more factors relating to Agoraphobic fears. The fact that slightly over 90% (i.e., the great majority) of the dimensions could be classified under one or more of the four a priori categories supports the argument (e.g., Eysenck, 1987) that the sources of phobic fear constitute a very restricted sample of potentially phobic stimuli. The findings are discussed in the context of the preparedness hypothesis. Suggestions for further research in this area are given, as well as references to guidelines to conducting valid factor analyses in order to maximize the validity of further findings.

*To whom reprint requests should be addressed.

Phobic dimensions, Part I was published in this journal in 1984 and dealt with the reliability and factorial validity of the measuring constructs of the Wolpe and Lang Fear Survey Schedule-III and the Marks and Mathews Fear Questionnaire (Arrindell, Emmelkamp, & Van der Ende, 1984). Phobic dimensions, Part II is in preparation (Arrindell, Van der Ende, & Emmelkamp, 1991) and will describe, among other things, the correlates of self-assessed fears and the convergent and divergent validity of the constructs that are measured with the aforesaid instruments.
samples, the remaining ten on students), while the number since that date has more than doubled (see below). The review by Granell de Aldaz (1982), although the most recent, is, as noted above, restricted to findings obtained with students. Neither the review of Wade (1978) nor that of Granell de Aldaz (1982) describes findings based on (non-student) community or general population samples, these being available now for some time (Arrindell, Emmelkamp, & Van der Ende, 1984). These limitations led to the updated review reported below, its main aim being to provide an answer to the question as to whether within studies any consistency emerges in the ways in which self-reported fears fall into a psychologically meaningful pattern or set of patterns, an issue first voiced over three decades ago by Dixon, De Monchaux, and Sandler (1957). In addition, it seeks to address the problem of whether the emerging pattern is consistent across a diversity of samples and across nationality (cf., Arrindell & Van der Ende, 1986).

REVIEW

The Sample of Studies

The sample of studies came from three sources: (a) the studies listed in Wade (1978) and Granell de Aldaz (1982); (b) a computerized literature search of the databases PsycINFO (1967–April 1990), Index Medicus (1966–April 1990) and Excerpta Medica (1974–April 1990) using the key terms “fear”, “phobias”, “factor (analysis; structure)”, “statistical correlation”, “self (report; evaluation; assessment)”; and (c) publications that were available to the present authors but which were neither included in the set of studies reported by Wade (1978) and Granell de Aldaz (1982) nor revealed by computerized literature search. To ensure that study sampling would be complete, dissertations contained by the PsycINFO database were also included. Indeed, such “hidden studies” may be of equal quality to published studies but may not have been published because the factorial structures obtained did not follow the general trend (compare Hyde & Linn, 1988, p. 55, for similar arguments in the area of meta-analysis). The studies sampled should also be well defined. For the purposes of the present review, only studies examining the dimensional structures underlying self-report measures assessing heterogeneous aspects of phobic anxiety/fear were considered. Thus, findings obtained with instruments specifically intended to assess either dental fears, homophobia, AIDS fear, fear of death and dying, specific animal fears, fear of being sexually assaulted, war-related fears, or fear of childbirth were excluded from the present review. Consequently, only findings obtained with such multi-item measures as the FSS or the Fear Questionnaire (FQ; Marks & Mathews, 1979) were dealt with. It should be noted, however, that
instruments containing both phobic and non-phobic symptoms (e.g., the FQ) were only taken into account if they were originally construed to represent predominant measures of phobic anxiety or avoidance. In addition, only the responses of (young) adults to such questionnaires were analyzed here.

Statistical Considerations

Sample size

A variety of rules have been set forth for determining the sample size required to produce a stable solution when performing a factor or component analysis (see, e.g., Arrindell & Van der Ende, 1985). The most popular rules suggest that sample size be determined as a function of the number of variables. Guadagnoli and Velicer (1988), however, have convincingly argued that these rules lack a theoretical rationale. In addition, they have demonstrated that such rules lack empirical support.

Using a Monte Carlo procedure to systematically vary sample size, number of variables, number of components, and component saturation (i.e., the magnitude of the correlation between the observed variables and the components) in order to examine the conditions under which a sample component pattern becomes stable relative to the population pattern, Guadagnoli and Velicer (1988) found, contrary to the popular rules, that component saturation and absolute sample size were the most important factors. To a lesser degree, the number of variables per component was also important, with more variables per component producing more stable results.

As a recommendation to the applied researcher, Guadagnoli and Velicer (1988) noted that, following an analysis, the component pattern should be assessed with respect to the number of variables defining a component and with respect to the magnitude of component loadings. If components possess four or more variables with loadings above .60, the pattern may be interpreted whatever the sample size used. Similarly, a pattern composed of many variables per component (10 to 12) but low loadings (.40) should be an accurate solution at all but the lowest sample sizes (N<150). If a solution possesses components with only a few variables per component and low component loadings, the pattern should not be interpreted unless a sample size of 300 or more observations has been used. Guadagnoli and Velicer (1988) strongly suggest replication if these conditions occur when N<300.

Sampling of variables

Item-clusters, which provide the basis for the identification of factors
or components, should be interpretable, i.e., one must sample the full range of variables when using factor analysis to explore a field. Using formal arguments, Kline and Barrett (1983, p. 144) pointed out that for factors to emerge with any clarity, it is generally wise to target at least three variables to load on them. Furthermore, Kline and Barrett (1983) note that overdetermination of factors is a good policy, favoring better interpretation and replicability (compare Guadagnoli & Velicer, 1988, p. 274). One additional argument for setting the minimum number of variables per factor at three is that with a smaller number than this no internal consistency — the magnitude of which is based on the average correlations among items and the number of items within a test (e.g., Nunnally, 1978, pp. 229–230) — can be properly determined for factorially-derived scales. There is general agreement among theorists and practitioners alike that rotated solutions containing factors/components with less than three variables with meaningful loadings are unreliable, difficult to replicate, and typically occur as a result of overextraction when the eigenvalue greater than unity rule is used as the sole or major criterion (e.g., Fitch, Scheirer, & Lisman, 1982; Zwick & Velicer, 1982, 1986; Walkey, 1983; Walkey & McCormick, 1985b; Velicer & Jackson, 1990a, b).

Stability (replicability and invariance) of factors

Since random data may produce interpretable factor analytic results (e.g., Horn, 1967), it has been emphasized that investigators using factor analytic techniques should provide some means of permitting evaluation of the stability of their findings (e.g., Armstrong & Soelberg, 1968). That is, validation across split or similar samples (replicability), or across different samples, testing occasions or relevant subject parameters such as sex, social class, ethnicity, etc. (invariance), should be obtained prior to accepting a particular factorial solution. Not infrequently, the similarity of factor structures across subsamples is determined by comparing the results from exploratory factor analyses conducted separately for each subsample. There is considerable debate, however, about the usefulness of this approach. Supported by formal arguments, Alwin and Jackson (1981), for example, have warned that the use of exploratory factor analysis in its conventional form to examine issues of invariance is of limited utility, and instead have argued for the use of confirmatory factor analysis (see also Marsh, 1985). An array of methods for comparing factors is available (see, e.g., Alwin & Jackson, 1981; Walkey & McCormick, 1985a; Barrett, 1986; Ten Berge, 1986) and it was deemed important to determine for each study which method (or methods) if any was utilized for determining the stability of the relevant factorial solution(s).
Other considerations;

Also among the major decisions that a researcher must make when performing an exploratory component or factor analysis are the determination of the number of factors/components to retain and the selection of a method of rotation (e.g., Velicer & Jackson, 1990b). Indeed, the decisions made at each point can have a substantial impact on the results and on the subsequent interpretation of those results (cf., Ford, MacCallum, & Tait, 1986; Velicer & Jackson, 1990a, b). For this reason, it was deemed appropriate to provide for each study the available information with respect to the type of rotation used and the factor extraction and/or interpretation criteria followed.

Dimensional Categorization System

On the basis of the review studies by Tasto (1977) and Granell de Aldaz (1982), the following dimensional classification for categorizing the different fear factors obtained across studies is proposed:

(I) Fears about interpersonal events or situations — fears of criticism, rejection, social conflicts, social evaluation, social interaction, interpersonal aggression, display of sexual and aggressive scenes etc.;

(II) Fears related to death, injuries, illness, blood and surgical procedures — the fears of illness include diseases, disabilities, and complaints, both physical and mental, for example, fears of (thoughts of) suicide, homosexuality, having a defective child, being mentally ill, sexual inadequacies such as impotence or frigidity, and losing control. In addition, factors are subsumed under this category if “the underlying concern appears to be the anticipatory fear of potential physical destruction on an elevation/depth continuum” (Gulas, McClanahan, & Poetter, 1975, p. 22), e.g., “Heights and deep water”. Furthermore, this category also includes fear of syncope, of contamination and other fears that imply a threat to one’s physical health;

(III) Fear of animals — creeping or crawling animals or insects; small, harmless animals, domestic animals, etc.

In addition, recent factor analytic studies (Arrindell et al., 1984; Arrindell & Van der Ende, 1986) have pointed to the importance of a fourth dimensional category which seems to reappear with some regularity in factor analyses of fear stimuli, namely Agoraphobic fears (IV). Following Marks (1987) “the term (agoraphobia) describes varying combinations of fears of going into stores, crowds, and public places; traveling alone in trains, buses, planes, and (less often) cars; entering closed spaces such as elevators, tunnels, theaters, and churches; crossing bridges; having haircuts; and leaving or remaining at home alone . . . (Although mild
fear of open spaces is often seen in agoraphobia, it is not a central feature” (p. 291). This conceptualization of the agoraphobic syndrome as a broad but coherent (i.e., internally consistent) set of symptoms or concerns reflecting a condition of fears of going out into public places of various kinds (Marks, 1967, 1970a, b) is termed *Classic (C) agoraphobia* (compare Eaton & Keyl, 1990) to distinguish it from more or less discrete dimensions of agoraphobia which measure specific elements included in the more general construct.

Using factor/components analysis, Johnston, Johnston, Wilkes, Burns, and Thorpe (1984) and Hamann and Mavissakalian (1988) identified at least two such cumulative unidimensional measures. Hamann and Mavissakalian (1988) revealed two purely agoraphobic factors involving travel or transportation and shopping; one factor that was agoraphobic but with social features (e.g., talking to a neighbor outdoors, visiting a friend’s home); another that was agoraphobic with claustrophobic features; and a somewhat heterogeneous (mixed) factor. (Unfortunately, three of these factors — Travel/transportation, Shopping and Claustrophobia — comprised only two items each, thereby representing a solution typified by overextraction.) Johnston et al. (1984) found two components which they termed Agoraphobia (avoidance of going to places) and Claustrophobia (avoidance of situations where the subject may be trapped, or restricted in movement). Neither of these components described a social phobia dimension. Thus, on the basis of these findings, it was anticipated that an agoraphobia factor could be manifested either as a broad factor (as defined in the classical sense) or in any of the different forms described by Johnston et al. (1984) and Hamann and Mavissakalian (1988).

Factors which could not be classified under any of the four dimensional categories mentioned above were assigned to a fifth residual category. To check the categorization, the content of the items making up each factor was closely examined to determine whether the majority of such items was effectively covered by its descriptive label.

Intercoder reliability was assessed for each of the dimensional categories. The categorization was done by two psychologists independently of each other. Percentage agreement was found to range from 97% to 100%. Disagreements were resolved through discussion.

**RESULTS AND DISCUSSION**

Table 1 gives an overview of each study with its corresponding year of publication, the instrument employed (and the number of items contained by it within parentheses), the type of sample used in the analysis including its sample size (where applicable, for males and females separately), and
Table 1. Results of 38 Factor Analytic Studies of Adults' Fears: 1957–1990

<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Dixon, De Menezes, &amp; Sandler (1957)</td>
<td>Self-Assessment Inventory (26)</td>
<td>125 M 125 F Psychiatric inpatients England</td>
<td>Not reported</td>
<td>Not specified</td>
<td>1 Separation anxiety 2 Castration anxiety</td>
<td>22.4%</td>
<td>No</td>
</tr>
<tr>
<td>2 &quot;Russell (1967)</td>
<td>“List of common fears” (40)</td>
<td>Sample A 200 M 200 F High school seniors USA</td>
<td>Orthogonal, Varimax</td>
<td>Loadings ≥ .50; conservative estimates (not specified) of the number of underlying factors; factor label should reflect the frame of reference typical of the age level to which it is applied</td>
<td>1 Disability and cold war 2 Macabre 3 Social helplessness 4 Morality 5 Disaster 6 Religion-supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample B 200 M 200 F Senior citizens; community volunteers USA</td>
<td>Orthogonal, Varimax</td>
<td>As with Sample A</td>
<td>1 Cold war 2 Macabre 3 Religion 4 Social alienation 5 Animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
fear of open spaces is often seen in agoraphobia, it is not a central feature" (p. 291). This conceptualization of the agoraphobic syndrome as a broad but coherent (i.e., internally consistent) set of symptoms or concerns reflecting a condition of fears of going out into public places of various kinds (Marks, 1967, 1970a, b) is termed Classic (C) agoraphobia (compare Eaton & Keyl, 1990) to distinguish it from more or less discrete dimensions of agoraphobia which measure specific elements included in the more general construct.

Using factor/components analysis, Johnston, Johnston, Wilkes, Burns, and Thorpe (1984) and Hamann and Mavissakalian (1988) identified at least two such cumulative unidimensional measures. Hamann and Mavissakalian (1988) revealed two purely agoraphobic factors involving travel or transportation and shopping; one factor that was agoraphobic but with social features (e.g., talking to a neighbor outdoors, visiting a friend's home); another that was agoraphobic with claustraphobic features; and a somewhat heterogeneous (mixed) factor. (Unfortunately, three of these factors — Travel/transportation, Shopping and Claustraphobia — comprised only two items each, thereby representing a solution typified by overextraction.) Johnston et al. (1984) found two components which they termed Agoraphobia (avoidance of going to places) and Claustrophobia (avoidance of situations where the subject may be trapped, or restricted in movement). Neither of these components described a social phobia dimension. Thus, on the basis of these findings, it was anticipated that an agoraphobia factor could be manifested either as a broad factor (as defined in the classical sense) or in any of the different forms described by Johnston et al. (1984) and Hamann and Mavissakalian (1988).

Factors which could not be classified under any of the four dimensional categories mentioned above were assigned to a fifth residual category. To check the categorization, the content of the items making up each factor was closely examined to determine whether the majority of such items was effectively covered by its descriptive label.

Intercoder reliability was assessed for each of the dimensional categories. The categorization was done by two psychologists independently of each other. Percentage agreement was found to range from 97% to 100%. Disagreements were resolved through discussion.

RESULTS AND DISCUSSION

Table 1 gives an overview of each study with its corresponding year of publication, the instrument employed (and the number of items contained by it within parentheses), the type of sample used in the analysis including its sample size (where applicable, for males and females separately), and
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Dixon, De Meschaux, &amp; Sandler (1957)</td>
<td>Self-Assessment Inventory (26)</td>
<td>125 M&lt;br&gt;125 F&lt;br&gt;Psychiatric inpatients&lt;br&gt;England</td>
<td>Not reported</td>
<td>Not specified</td>
<td>1 Separation anxieties&lt;br&gt;2 Castration anxiety</td>
<td>22.4%</td>
<td>No</td>
</tr>
<tr>
<td>2 *Russell (1967)</td>
<td>“List of common fears” (49)</td>
<td>Sample A&lt;br&gt;200 M&lt;br&gt;200 F&lt;br&gt;High school seniors&lt;br&gt;USA</td>
<td>Orthogonal, Varimax</td>
<td>Loadings ≧ .50; conservative estimates (not specified) of the number of underlying factors; factor label should reflect the frame of reference typical of the age level to which it is applied</td>
<td>1 Disability and cold war&lt;br&gt;2 Macabre&lt;br&gt;3 Social helplessness&lt;br&gt;4 Morality&lt;br&gt;5 Disaster&lt;br&gt;6 Religion-supernatural</td>
<td>1 Disability and cold war&lt;br&gt;2 Macabre&lt;br&gt;3 Rational dangers&lt;br&gt;4 Religion&lt;br&gt;5 Social alienation</td>
<td>M 45.4%&lt;br&gt;F 42.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample B&lt;br&gt;205 M&lt;br&gt;200 F&lt;br&gt;Senior citizens; community volunteers&lt;br&gt;USA</td>
<td>Orthogonal, Varimax</td>
<td>As with Sample A</td>
<td>1 Cold war&lt;br&gt;2 Macabre&lt;br&gt;3 Religion&lt;br&gt;4 Social alienation&lt;br&gt;5 Animals</td>
<td>1 Dependency&lt;br&gt;2 Macabre&lt;br&gt;3 Rational dangers</td>
<td>M 50.6%&lt;br&gt;F 37.5%</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Rubin, Katkin, Weiss, &amp; Elfan (1968)</td>
<td>FSS-II (51)</td>
<td>Sample A 161 M 109 F Students USA</td>
<td>Orthogonal, Quartimax</td>
<td>Not specified</td>
<td>1 Water 2 Death and illness 3 Interpersonal events 4 Discrete (concrete) stimuli</td>
<td>1 Social competence 2 Death and illness 3 Water 4 Social interaction</td>
<td>Not reported² Yes, exploratory³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample B 464 M 614 F Students USA</td>
<td>Orthogonal, Quartimax</td>
<td>Not specified</td>
<td>1 Interpersonal events 2 Concrete objects 3 Death and illness 4 Traumatic injury 5 Water</td>
<td>1 Death and illness 2 Interpersonal events 3 Water 4 Concrete objects</td>
<td></td>
</tr>
<tr>
<td>4 Wilson &amp; Priest (1960)</td>
<td>“List of fears based on an open-ended questionnaire” (18)¹</td>
<td>149 M 149 F Students New Zealand</td>
<td>Orthogonal, Varimax</td>
<td>Eigenvalue = 1.00; Close scrutiny of different rotated solutions; choosing the solution which is most easily interpreted</td>
<td>1 General insecurity 2 Wild animals 3 Harmless nocturnal animals 4 Domestic animals</td>
<td>&lt; 56.28%³ No</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Sample Size</td>
<td>Orthogonality</td>
<td>Leithings</td>
<td>Fears</td>
<td>Social Interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td>---------------</td>
<td>-----------</td>
<td>-------</td>
<td>-------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bernstein &amp; Allen (1969)</td>
<td>946 M 868 F Students USA</td>
<td>Orthogonal, Varimax</td>
<td>Not specified</td>
<td>1 Death and illness 2 Social interaction 3 Negative social evaluation 4 Live organisms 5 Violence</td>
<td>1 Live organisms 2 Social interaction 3 Negative social evaluation 4 Personal illness or death 5 Water 6 Illness or death of others</td>
<td>1 Social interaction 2 Death, illness and injury 3 Live organisms 4 Negative social evaluation 5 Water</td>
<td></td>
</tr>
<tr>
<td>Braun &amp; Reynolds (1969)</td>
<td>226 M 209 F Students USA</td>
<td>Orthogonal</td>
<td>Loadings &gt; .40 to define a factor in the rotated matrix?</td>
<td>1 Death 2 Physical assault 3 Social criticism 4 Creeping, crawling animals 5 Water-related experiences 6 Social competence 7 Medical intervention 8 Objects of death 9 Achievement</td>
<td>1 Social criticism 2 Medical intervention 3 Contamination 4 Dangerous places 5 Sudden noises 6 Active physical assault 7 Creeping, crawling animals 8 Potential physical assault 9 Cuts 10 Water-related experiences 11 Social competence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Measure</td>
<td>Sample and country</td>
<td>Rotation</td>
<td>Factor extraction and/or interpretation criteria</td>
<td>Factors identified</td>
<td>Total percentage variance</td>
<td>Replicability and/or invariance (exploratory or confirmatory)</td>
</tr>
<tr>
<td>---------------</td>
<td>----------</td>
<td>--------------------</td>
<td>----------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 7 Rubin, Lawhin, Tasto, & Nanecek (1969) | FSS (122) | 131 M 107 F Students USA | Oblique, Promax | Emerging factors accounting for at least 90% of the variance are rotated; loadings ≥ .35 | 1 Small animals  
2 Precipitators and manifestations of hostility  
3 Morals and sex  
4 Isolation and loneliness  
5 Anatomical destruction and physical pain | 91.1% | No |
| 8 *Bates (1971) | Extended FSS (77) | 100 M Psychiatric inpatients (veterans) USA | Orthogonal, Varimax | Eigenvalue > 1.00; loadings ≥ .35 | 1 Tissue damage-medical  
2 Interpersonal events  
3 Noise  
4 Cold blooded animals  
5 Classical phobias-death and 12 remaining factors which were not interpreted | 77.1% | No |
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample</th>
<th>Instrument</th>
<th>Gender</th>
<th>Sample Size</th>
<th>Methodology</th>
<th>Loadings</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landy &amp; Gaupp (1971)</td>
<td>494 M, F Students USA</td>
<td>FSS-II</td>
<td>Orthogonal, Varimax</td>
<td>Scree test; loading ≥ .40 on one factor and &lt; .40 on remaining factors; factor interpretability dependent on significant loadings which are replicated across split samples</td>
<td>1 Animate, non-human organisms, 2 Interpersonal events, 3 The unknown, 4 Noise, 5 Medical-surgical procedures</td>
<td>39%</td>
<td>Yes, exploratory</td>
</tr>
<tr>
<td>Lawlis (1971)</td>
<td>76 M, 109 F Psychiatric in- and outpatients of a national sample of psychologists and psychiatrists USA</td>
<td>FSS</td>
<td>Oblique, Promax</td>
<td>Emerging factors accounting for at least 90% of the variance are rotated; loadings ≥ .34</td>
<td>1 Losing status and social inadequacy, 2 Small animals, 3 Disease and wounds</td>
<td>90.8%</td>
<td>No</td>
</tr>
<tr>
<td>Study</td>
<td>Measure (no. of items)</td>
<td>Sample and country</td>
<td>Rotation</td>
<td>Factor extraction and/or interpretation criteria</td>
<td>Factors identified</td>
<td>Total percentage variance</td>
<td>Replicability and/or invariance (exploratory or confirmatory)</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>--------------------------------------------------</td>
<td>--------------------</td>
<td>------------------------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>11 Van der Toorn &amp; Bremer (1971)</td>
<td>PSS (89)</td>
<td>192 M 205 F Psychiatric inpatients The Netherlands</td>
<td>Not reported</td>
<td>Eigenvalue $\geq 1.00$; the first ten out of the 22 factors with eigenvalues $\geq 1.00$ are selected for interpretative purposes</td>
<td>1 Negative social evaluation 2 Illness and death 3 Small animals 4 (Social) shyness 5 Confrontation with disability 6 Being caught in a nature disaster 7 Aggressive encounters 8 Travelling in enclosed spaces 9 Confined places 10 Heights</td>
<td>37.1%</td>
<td>No¹¹</td>
</tr>
<tr>
<td>12 Harris (1972)</td>
<td>Geer FSS (51)</td>
<td>356 M, F Students USA</td>
<td>Oblique</td>
<td>Scree test; previous research findings; loadings $&gt; .04$</td>
<td>1 Unfavorable social evaluation 2 Repulsive small animals 3 Situational incompetence 4 Drowning 5 Death</td>
<td>Not reported¹²</td>
<td>Yes, confirmatory¹³</td>
</tr>
<tr>
<td>Study</td>
<td>Sample Size</td>
<td>Participants</td>
<td>Methodology</td>
<td>Loadings</td>
<td>Factors</td>
<td>Items</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td>--------------</td>
<td>-------------</td>
<td>----------</td>
<td>---------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Measure (no. of items)</td>
<td>Sample and country</td>
<td>Rotation</td>
<td>Factor extraction and/or interpretation criteria</td>
<td>Total percentage variance</td>
<td>Replicability and/or invariance (exploratory or confirmatory)</td>
<td>Factors identified</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------</td>
<td>--------------------</td>
<td>-----------------------------</td>
<td>------------------------------------------------</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>14 *Meikle &amp; Mitchell (1974)</td>
<td>FSS-III (79)</td>
<td>20 M 95 F</td>
<td>Sample of non-hospitalized Ss with specific fears considered by themselves to be of sufficient severity to consider seriously an offer of treatment Canada</td>
<td>Orthogonal, Varimax</td>
<td>Rotation of all factors with eigenvalues ≥ 1.00; loadings ≥ .40</td>
<td>61.2%</td>
<td>No</td>
</tr>
</tbody>
</table>
15 Boynton (1975) Fears and Worries Index (70)

138 M 235 F
Members of colleges, community organizations, or church groups from five states USA

Factor loadings
> .30; five variables with highest loadings per factor and loadings < .30 on other factors for ease of interpretation

1 Identity and belonging fears
2 Personal socioeconomic fears
3 Death and ill health related fears
4 Diet related fears
5 Morbid fears

1 Stereotypic female fears
2 Personal competency fears
3 Social responsibility fears
4 Social competency fears
5 Death fears

1 Social competence
2 Seeing blood
3 Isolation
4 Social criticism
5 Animals and insects
6 Weather and sudden noises
7 Dangerous places
8 Medical intervention

16 Goldberg, Yinon, & Cohen (1975)

IPS1** (97)

129 M 215 F
Students Israel

Orthogonal Loadings
≥ .40; at least 4 items per factor

1 Seeing blood
2 Social competence
3 Medical intervention
4 Social criticism
5 Animals and insects
6 High places
7 Danger signals
8 Sickness

1 Social competence
2 Seeing blood
3 Isolation
4 Social criticism
5 Animals and insects
6 Weather and sudden noises
7 Dangerous places
8 Medical intervention

M 36.3% F 38%
No

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Galat, McClenahan, &amp; Poorter (1975)</td>
<td>FSS (90)</td>
<td>137 M 168 F Students USA</td>
<td>Orthogonal</td>
<td>Eigenvalue ≧ 1.00; &quot;elbow criterion&quot;; loadings ≧ .50 if of an item into an orthogonal factored scale</td>
<td>1 Hostile-dependent 2 Body assault 3 Developmental fear 4 Performance and evaluation 5 Death evasion 6 Nuisance animals</td>
<td>41.8%</td>
<td>No</td>
</tr>
</tbody>
</table>
18 *Holmes, Rothstein, Stout, & Rosecrans (1975)*

<table>
<thead>
<tr>
<th>FSS</th>
<th>50 M</th>
<th>50 F</th>
<th>1 Orthogonal, Varimax Rotations of the 16 emerging factors</th>
</tr>
</thead>
</table>

1. Being socially unacceptable
2. Commercial transportation
3. Exposure to suffering
4. Destructive agents
5. Repulsive phenomena
6. High places
7. Spooky phenomena
8. Vast expanses
9. Authority
10. Cars
11. Noisy events
12. Domestic carnivores
13. Meeting strangers
14. Nudity
15. Being maltreated
16. Irrational behavior of others

86%  No

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 *Holmes et al. (1975) (continued)</td>
<td>2 Oblique</td>
<td>Rotations of the 16 emerging factors</td>
<td></td>
<td>1 Non-interpretable</td>
<td></td>
<td>100%</td>
<td>No</td>
</tr>
</tbody>
</table>
19 *Stratton & Moore (1977) FSS
223 M
245 F
Students
USA
Orthogonal, Varimax

1. Failure/rejection
2. Blood
3. Social interaction
4. Insects
5. Death
6. Human noise
7. Automobiles
8. Medical/surgical
9. Water
10. Airplanes
11. Death/injury: loved one
12. Hostile people
13. Heights
14. Storms
15. Darkness
16. Contamination
17. Nudity
18. Cats
19. Loneliness/travel
20. Dead animals
21. Weapons
22. Large open spaces
23. Not interpreted

Eigenvalues
≥ 1.00;
loadings
≥ .35

55%
Yes, confirmatory

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure and country</th>
<th>Rotation</th>
<th>Factor extraction and interpretation criteria</th>
<th>Factors identified</th>
<th>Males</th>
<th>Females</th>
<th>Total variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Haliam &amp; Hafner (1978) Fear and General Symptom Questionnaire (70)</td>
<td>56 M, 115 F</td>
<td>Varimax followed by Oblique (Promax solution)</td>
<td>Initial choice of 10 factors based on the range of factors identified in previous studies; interpretability of factors and intercorrelations of the oblique factors to guide the final number of factors chosen for rotation</td>
<td>All phobics: 1 Agoraphobia, 2 Social, 3 Injury/disease (4 Depression), 5 Animal, 6 Storms, darkness (7 General symptoms), 8 Travel by car Miscellaneous Specific and Social phobics: 1 Crowded public places, travelling, social situations, 2 General symptoms plus some specific fears, 3 Claustrophobia, 4 Storms, heights and darkness, 5 Animals plus some anxiety symptoms, 6 Fainting, blood, hospitals, and vomit</td>
<td></td>
<td></td>
<td>52.4%</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>England</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

W. A. Arrindell et al.
<table>
<thead>
<tr>
<th>Study</th>
<th>Phobic Dimensions</th>
<th>Agoraphobics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hallam &amp; Hafner (1978)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seidenstücker &amp; Wernberger (1978)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

203 M
276 F
Students
West Germany

Orthogonal, Varimax

Modified Screen test: \( \chi^2/df \leq .50 \)

1 Social
2 Animals
3 Travel
4 General symptoms
5 Illness and death
6 Shopping and crowded public places
7 Heights and deep water
8 General symptoms, and fear of criticism
9 Injury
10 Cats, dogs, and dogs

<table>
<thead>
<tr>
<th></th>
<th>No reported</th>
<th>Yes, confirmatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per cent</td>
<td>38.3%</td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 Wade (1976)</td>
<td>FSS (40)</td>
<td>400 M, F Students USA</td>
<td>1 Orthogonal, Varimax 2 Oblique, Oblimin</td>
<td>Test of adequacy of correlation matrix; eigenvalue &gt; 1.00; Scree tests; examination of residuals; loadings ≥ .40 on target factor and no higher loadings on other factors; a minimum of four variables per factor; factor replicability</td>
<td>1 Violations of societal norms 2 Nuisance animals 3 Injury 4 Interpersonal conflict 5 Isolation or alienation</td>
<td>Principal factors, 85.9%; Alpha factors, 85.8%</td>
<td>Yes, confirmatory²²</td>
</tr>
</tbody>
</table>

<p>| 23 Torgersen (1979) | Phobic Fear Questionnaire (51) | 99 same-sexed pairs of twins (22 MZ female pairs, 28 MZ male pairs, 27 DZ female and 22 DZ male twin pairs); Predominantly non-psychiatric sample²³ Norway | Orthogonal, Varimax | Loadings ≥ .40; replication of the factor analysis of the reduced set of items (38) | 1 Separation 2 Animals 3 Mutilation 4 Social 5 Nature | 53% | No |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Gender Distribution</th>
<th>Methodology</th>
<th>Factor Structure</th>
<th>Trait Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrindell (1980)</td>
<td>151 M 552 F</td>
<td>Non-institutionalized phobic club members</td>
<td>Orthogonal, Varimax</td>
<td>Eigenvalue ≥ 1.00; loadings ≥ .40; second highest loading of an item should be either low or moderate to ensure a qualitative difference between loadings; minimum number of items to a factor set at three; factor invariance</td>
<td>1 Interpersonal events 2 Agoraphobia 3 Tissue damage and bodily assaults 4 Small animals 5 Death evasion 6 Noise</td>
</tr>
<tr>
<td>Spinks (1980)</td>
<td>120 African (Natal) Indians</td>
<td>Oblique, Oblimin (delta=0)</td>
<td></td>
<td>Screen test (location of the elbow of an eigenvalue screen curve); loadings &gt; .45</td>
<td>1 Physical danger 2 Interpersonal 3 Animal</td>
</tr>
<tr>
<td>Study</td>
<td>Measure (no. of items)</td>
<td>Sample and country</td>
<td>Rotation</td>
<td>Factor extraction and/or interpretation criteria</td>
<td>Factors identified</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>26 &quot;Kalouspek, Petersen, &amp; Levis (1981)</td>
<td>FSS-II (51)</td>
<td>694 M 1067 F Students USA</td>
<td>Orthogonal, Varimax</td>
<td>Eigenvalue-one criterion, supplemented by the scree test; loadings $\geq 0.4473$</td>
<td>1 Death and injury 2 Negative social evaluation &amp; interaction 3 Live organisms 4 Transportation 5 Hazardous situations 6 Conflict 7 Religion—death</td>
</tr>
<tr>
<td>27 Kirkpatrick &amp; Berg (1981)</td>
<td>FSS (27)</td>
<td>200 M 345 F Students USA</td>
<td>Orthogonal, Varimax</td>
<td>Test of adequacy of the correlation matrix; eigenvalue $\geq 1.00$; each factor contains at least four items with loadings $\geq 0.40$</td>
<td>1 Social rejection 2 Unpredictable danger or threat to life</td>
</tr>
<tr>
<td>Study</td>
<td>Measure</td>
<td>Sample</td>
<td>Methodology</td>
<td>Percent</td>
<td>Diagnosis</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>--------</td>
<td>-------------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>Arrindell &amp; Zwaan (1983)</td>
<td>AZU-Fear Questionnaire&lt;sup&gt;20&lt;/sup&gt;</td>
<td>82 M, 42 F</td>
<td>Non-institutionalized phobic club members</td>
<td>The Netherlands</td>
<td>Orthogonal, Varimax</td>
</tr>
<tr>
<td>&quot;Doctor&quot; (1982)</td>
<td>A Fear Survey Scale&lt;sup&gt;21&lt;/sup&gt;</td>
<td>89 M, 31 F</td>
<td>Agoraphobic patients</td>
<td>USA</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

1. Social acceptance
2. Sickness/incapacity
3. Being alone/territorial apprehension
4. Thunder/lightning
5. Airplanes
6. Closed places
7. Phobia/fear
8. Loneliness
9. Death
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 *Doctor (1982) (continued)</td>
<td>B Fear Situations Scale (not specified)⁶⁰</td>
<td>83 M 315 F Agoraphobic patients USA</td>
<td>Not reported</td>
<td>Not specified</td>
<td>1 Presence of others/ trapped 2 Alone 3 Heights 4 Elevators 5 Driving 6 Unfamiliar situations</td>
<td>Not reported</td>
<td>No</td>
</tr>
<tr>
<td>30 Granell de Alz (1982)</td>
<td>Venezuelan Fear Survey Schedule (64)</td>
<td>553 M 318 F Students Venezuela</td>
<td>1 Orthogonal, Varimax 2 Oblique, Obmin⁷¹</td>
<td>Eigenvalue &gt; 1.00; factor contains a minimum of four variables; factor loadings ≥ .40, with the variables not having similarly high loadings on other factors; invariance across rotational procedures and split samples of Ss⁶⁰</td>
<td>1 Aversive interpersonal events 2 Animals and insects 3 Violence and bodily assault 4 Injuries and surgical operations 5 Animals and insects 6 Death and physical threat</td>
<td>M 84.2% F 80.3% M, F 86.0%</td>
<td>Yes, exploratory³²</td>
</tr>
<tr>
<td>Name</td>
<td>Sample Size</td>
<td>Design</td>
<td>Measure</td>
<td>Analysis Method</td>
<td>Findings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>--------</td>
<td>---------</td>
<td>-----------------</td>
<td>----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 Katsounis, Mervyn-Smith, &amp; Pickering (1983)</td>
<td>547 M, F 201 M 302 F</td>
<td>Oblique, direct Oblimin with delta = 0</td>
<td>Scree test; loadings ≥ .40; rotated solution which is conceptually most clear</td>
<td>1 Social inadequacy 2 Tissue damage 3 Travel and associated situations 4 Animals</td>
<td>100% No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Measure and country</td>
<td>Factor extraction and/or interpretation criteria</td>
<td>Factors identified</td>
<td>Total percentage variance</td>
<td>Replicability and/or invariance (exploratory or confirmatory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 Arrindell, Emmelkamp, &amp; Van der Ende (1994)</td>
<td>1 FSS-III (76)³⁴</td>
<td>Sample A 92 M 337 F Non-institutionalized phobic club members The Netherlands</td>
<td>Confirmatory analysis using the Varimax rotated components structure reported in Arrindell (1986) as the criterion template</td>
<td>1 Social 2 Agoraphobia 3 Bodily injury, death and illness 4 Sexual and aggressive scenes 5 Harmless animals</td>
<td>M 46.80% F 40.99% M, F 41.91%</td>
<td>Yes, confirmatory³⁵</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample B 79 M 323 F Non-institutionalized phobic club members The Netherlands</td>
<td>As above</td>
<td>As above</td>
<td>M 51.97% F 37.76% M, F 39.97%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample C 191 M 213 F 4 sex withheld Psychiatric outpatients The Netherlands</td>
<td>As above</td>
<td>As above</td>
<td>M 44.49% F 41.51% M, F 43.34%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Sample D | As above | As above | M 41.13%  
|          |          |          | F 45.50%  
|          |          |          | M, F 45.66%  

| Sample E | As above | As above | M 35.78%  
|          |          |          | F 34.28%  
|          |          |          | M, F 34.25%  

| Sample F | As above | As above | M 34.05%  
|          |          |          | F 30.76%  
|          |          |          | M, F 31.63%  

See note 35
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 Arrindell et al. (1984) (continued)</td>
<td>2 Fear Questionnaire (20)</td>
<td>Samples A, B, C 193 M 757 F Non-institutionalized phobic club members The Netherlands</td>
<td>Confirmatory analysis using a theoretical weight matrix based on the scoring key reported in Marks &amp; Mathews (1979)</td>
<td>1 Agoraphobia 2 Blood-injury 3 Social (4 Anxiety–depression)</td>
<td>M 59.3% F 57.3% M, F 57.5%</td>
<td>Yes, confirmatory</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample G 137 M 140 F Community sample The Netherlands</td>
<td>As above</td>
<td>As above</td>
<td></td>
<td>M 53.4% F 57.5% M, F 54.6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample H 144 M 123 F 3 sex withheld Students The Netherlands</td>
<td>As above</td>
<td>As above</td>
<td></td>
<td>M 51.0% F 49.1% M, F 49.5%</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Sample</td>
<td>Orthogonal, Eigenvalue</td>
<td>Phobic Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------</td>
<td>------------------------</td>
<td>-------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hafner &amp; Ross (1984)</td>
<td>FSS (69)</td>
<td>Orthogonal, Varimax ≥ 1.00; loadings ≥ .35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>160 F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agoraphobic patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>England</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Australia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(89)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>84.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Illness or injury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Storms and darkness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agoraphobia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heights and deep water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Harmless or domestic animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Claustrophobia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Startling&quot; animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Criticism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Syncope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes, confirmatory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>45.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Total percentage variance</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 *Cottraux, Bouvard, &amp; Mesty (1987)</td>
<td>Fear Questionnaire (20)</td>
<td>85 M 95 F</td>
<td>Obsessive-compulsive neurotics, (N=45), agoraphobics (N=46), social phobics (N=34), students and hospital personnel (non-patients, N=55), France</td>
<td>Not reported Not specified</td>
<td>A Total sample (N=180) 1. Agoraphobia — anxiety—depression 2. Blood-injury 3. Agoraphobia and criticism</td>
<td>44.6% Yes, exploratory</td>
<td></td>
</tr>
<tr>
<td>Dimension</td>
<td>Phobias</td>
<td>Yes, Exploratory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Agoraphobics</td>
<td>36.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Agoraphobia — anxiety-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Blood-injury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Social</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Social phobics</td>
<td>42%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Agoraphobia — (anxiety-depression)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Blood-injury, social</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Agoraphobia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Non-patients</td>
<td>47.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Agoraphobia, social, anxiety-depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Agoraphobia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Social</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Measure (no. of items)</td>
<td>Sample and country</td>
<td>Rotation</td>
<td>Factor extraction and/or interpretation criteria</td>
<td>Factors identified</td>
<td>Total percentage variance</td>
<td>Replicability and/or invariance (exploratory or confirmatory)</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------</td>
<td>--------------------</td>
<td>-------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------</td>
<td>---------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>36 Oei, Cavallo, &amp; Evans (1987)</td>
<td>FIS-III (60)</td>
<td>336 M, F; 130 agoraphobics with panic attacks: 28 M; 102 F; 98 Ss with other anxiety disorders: 33 M; 66 F; 108 non-patient members of the general population: 52 M; 76 F Australia</td>
<td>Orthogonal (Varimax) and oblique (Promax)</td>
<td>Not specified</td>
<td>Males: 1 Agoraphobia, 2 Small animals, 3 Social, 4 Cognitive or negative evaluation, 5 Bodily harm and injury, 6 Social interaction</td>
<td>46.14%</td>
<td>Yes, exploratory³⁸</td>
</tr>
</tbody>
</table>
37 Brown & Crawford (1988) FSS-III 474 M 545 F Students USA Orthogonal (Varimax) and Oblique

Eigenvalue ≥ 1.00; item loading ≥ .40 on one factor and < .40 on another factor; a minimum of four items per factor; factor loadings ≥ .40 in both orthogonal and oblique rotations

1 Interpersonal events
2 Animals and insects
3 Medical procedures
4 Environmental concerns

Orthogonal
e Yes, exploratory Oblique
M, F 31.44%
M, F 31.38%

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Measure (no. of items)</th>
<th>Sample and country</th>
<th>Rotation</th>
<th>Factor extraction and/or interpretation criteria</th>
<th>Factors identified</th>
<th>Replicability and/or invariance (exploratory or confirmatory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 Arrindell, Soley, Ledwidge et al. (1990)</td>
<td>FSS-III (76)</td>
<td>262 phobic and obsessive-compulsive outpatients: 153 phobics, 109 obsessive-compulsive patients, 96 M, 163 F Canada (Anglophones)</td>
<td>Confirmatory analysis using the Varimax rotated components structure reported in Arrindell (1980) as the criterion template</td>
<td>1 Social 2 Agoraphobia 3 Bodily injury, death and illness 4 Sexual and aggressive scenes 5 Harmless animals</td>
<td>Phobias M, F 43.27% Obsessive-compulsives M, F 45.48% Pooled patient sample M 45.12% F 43.50%</td>
<td>Yes, confirmatory²</td>
</tr>
</tbody>
</table>

*Study characterized by overextraction of factors, i.e. investigation in which factors have been interpreted which contained less than three items with meaningful factor loadings.

Note. M = Males, F = Females, M, F = Males plus females. FSS = Fear Survey Schedule. Footnotes are given at the end of this article in the Appendix.
the country in which the data were gathered. With respect to the methods of analysis, the type of rotation, the factor extraction and/or interpretation criteria, the factors identified, and the amount of variance explained by a given factorial solution (for informative purposes only) are also set out in this table. In addition, Table 1 shows whether the factors that were identified were based on data from males, females or a pooled sample of males and females, and also whether attempts had been made to examine the replicability and/or invariance characteristics of the relevant factorial solution(s).

Foregoing Analyses

It will be seen from Table 1 that a total of 38 studies were located, including two doctoral dissertations (Harris, 1972; Boynton, 1975). The earliest year of publication was 1957, the latest 1990. Studies were carried out in 12 different countries: U.S.A., the Netherlands, England, Canada, Australia, New Zealand, Israel, West Germany, Norway, South Africa, Venezuela, and France. However, half of the total number of studies (n=19) came from the U.S.A., with the Netherlands and England representing the countries in which the next largest numbers of studies were carried out. Since a number of investigators used two or more samples, more than one instrument, or two types of rotation, the total number of potential analyses that were available for the separate or pooled sexes far exceeded the total number of studies found. Seven studies (18%) utilized community Ss, either alone (n=5) or in combination with students (n=2); 16 studies (42%) made analyses on data from psychiatric patients, or potential psychiatric patients (Meikle & Mitchell, 1974), or non-institutionalized phobic club members (n=2), while a slight majority (n=20 or 53%) used for their analyses the responses of (non-patient) students only. Only four studies (Russell, 1967; Arrindell et al., 1984; Cottraux, Bouvard, & Messy, 1987; Oei, Cavallo, & Evans, 1987) used more than one sample type separately in their analyses.

A relatively large variety of instruments was employed with the number of stimuli involved varying from a low of 18 (cf., Wilson & Priest, 1968) to a high of 161 (cf., Seidenstücker & Weinberger, 1978).

Studies were furthermore characterized by a preference for using orthogonal rotations, followed by oblique and a combination of both, while the type of rotation used remained unspecified in five analyses. In eight analyses, factor and/or interpretation criteria were not specified, and it was difficult to categorize the remaining studies on account of the heterogeneity of the strategies followed. However, in a clear majority of all analyses, there seemed to be a strong inclination to set the lower bound for an acceptable factor loading at .40.
Main Analyses

First, it was determined whether the sample of studies contained solutions typified by factor overextraction, i.e., by factors kept for interpretative purposes despite the fact that they contained less than the minimum required number of three items. This appeared to be the case in 13 out of 38 studies (or 34%). Unfortunately, one or several factors in such solutions may represent fragments of larger factors, thereby rendering the value of the conclusions derived from such findings somewhat ambiguous. The studies that are characterized by overextraction have been designated a star in Table 1 and were excluded from further analyses. Second, notice was taken of whether, in the remaining 25 studies, the stability of the relevant factorial solutions had been examined. It appeared that such an examination had been accomplished in 13 investigations (52%). From these 13 studies, 7 explicitly stated and specified the use of a confirmatory technique. Since it would be likely if, following the serious criticisms of Wade (1978) of the quality of studies in this area of research, some improvements were to be observed, it was additionally determined whether the number of studies characterized by overextraction published after 1978 (including Wade’s own study) had significantly decreased relative to the number published prior to the publication of Wade’s study. This indeed proved to be the case ($\chi^2 = 3.75$, df = 1, $P < .05$, one-tailed). However, for the subset of studies not characterized by overextraction, no increase was observed in the number of attempts to determine replicability or invariance of factors, irrespective of whether an exploratory or a confirmatory approach had been taken ($\chi^2 = 1.92$, df = 1, NS).

Table 2 gives a survey of the 25 reliable studies which provided the factors for distribution across the four chosen major categories and one residual category. It also shows the seven studies (indicated by a star) in which a confirmatory approach was used to determine factor constancy. Where studies provided factors for both males and females separately and for males and females pooled, the dimensions obtained from the pooled data were used for categorization due to the obvious interdependence of the findings and to the higher reliability of the larger sample.

Not all studies provided the specific item-factor loadings from which it could be estimated whether the sample size was large enough. However, of the 18 studies in which no confirmatory approach was used, only five (Rubin, Katkin, Weiss, & Efran, 1968; Boynton, 1975; Goldberg, Yinon, & Cohen, 1975; Torgersen, 1979; Spinks, 1980) employed $N_s < 150$, with none going well below 100.

A total of 194 factors (or components) were identified. In classifying these, it appeared that, in the great majority of cases (187 out of 194 factors or 96.4%), there was excellent or at least good concordance between the
Table 2. Categorization of Factors/Components Identified in Each of 25 Studies not Characterized by Overextraction of Factors Across Four Major First-Order Clusters of Fears, with an Additional Category for Factors/Components Falling Outside these Four Clusters

<table>
<thead>
<tr>
<th>Study</th>
<th>No. of samples</th>
<th>Factors</th>
<th>(I) Interpersonal events or situations</th>
<th>(II) Death, injuries, illness, blood and surgical procedures</th>
<th>(III) Animals</th>
<th>(IV) Agoraphobic fears</th>
<th>Other fears (specified)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dixon et al. (1957)</td>
<td>1</td>
<td>(M, F)</td>
<td>(M)</td>
<td>(M)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>3</td>
<td>Rubin et al. (1968)</td>
<td>2</td>
<td>1 (M), 2 (F)</td>
<td>1 (M), 1 (F)</td>
<td>1 (M)</td>
<td>(M)</td>
<td>(F)</td>
</tr>
<tr>
<td>7</td>
<td>Rubin et al. (1969)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>2 (M), 1 (F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>9</td>
<td>Landy &amp; Gaupep (1971)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>10</td>
<td>Lawlis (1971)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>12*</td>
<td>Harris (1972)</td>
<td>1</td>
<td>2 (M, F)</td>
<td>1 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>15</td>
<td>Boynton (1975)</td>
<td>1</td>
<td>2 (M, 3 (F)</td>
<td>1 (M), 2 (F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>16</td>
<td>Goldberg et al. (1975)</td>
<td>1</td>
<td>2 (M, 3 (F)</td>
<td>5 (M), 3 (F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>17</td>
<td>Gulas et al. (1975)</td>
<td>1</td>
<td>2 (M, F)</td>
<td>2 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>21*</td>
<td>Seidenzucker &amp; Weinberger (1978)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>3 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>22*</td>
<td>Wade (1978)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>23</td>
<td>Torgerson (1979)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>2 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>24*</td>
<td>Arrindell (1980)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>25</td>
<td>Spinks (1980)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>(M, F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
<tr>
<td>27</td>
<td>Kirkpatrick &amp; Berg (1981)</td>
<td>1</td>
<td>1 (M), 2 (F)</td>
<td>1 (M), 2 (F)</td>
<td>1 (F)</td>
<td>(M, F)</td>
<td>(C)</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>No. of samples</th>
<th>(I) Interpersonal events or situations</th>
<th>(II) Death, injuries, illness, blood and surgical procedures</th>
<th>(III) Animals</th>
<th>(IV) Agoraphobic fears</th>
<th>Other fears (specified)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 Arrindell &amp; Zwaan (1982)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>2 (M, F)</td>
<td></td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td>30 Granell de Aldaz (1982)</td>
<td>1</td>
<td>2 (M, F)</td>
<td>3 (M, F)</td>
<td>1 (M, F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 Kersounis et al. (1983)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td></td>
</tr>
<tr>
<td>32* Arrindell et al. (1984)</td>
<td>5 (FSS)</td>
<td>2 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 (FQ)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td>33 Hafner &amp; Ross (1984)</td>
<td>1</td>
<td>2 (F)</td>
<td>3 (F)</td>
<td>2 (F)</td>
<td>3 (F)</td>
<td>Storms and darkness: 1 (F)</td>
</tr>
<tr>
<td>34* Arrindell &amp; Van der Ende (1986)</td>
<td>1</td>
<td>2 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td>36 Oei et al. (1987)</td>
<td>1</td>
<td>3 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
<tr>
<td>37 Brown &amp; Crawford (1988)</td>
<td>1</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td></td>
</tr>
<tr>
<td>38* Arrindell et al. (1990)</td>
<td>1</td>
<td>2 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F)</td>
<td>1 (M, F), (C)</td>
<td></td>
</tr>
</tbody>
</table>

* Studies in which evidence was presented for replicability and/or invariance of the relevant factorial solution(s).

Note. M = Males, F = Females, M, F = Males plus females. C = Classic agoraphobic. FSS = Fear Survey Schedule; FQ = Fear Questionnaire. The study numbers correspond to the numbering in Table 1. The numbers preceding the "M"s, "F"s and "M, F"s indicate the numbers of factors/components identified in the relevant study.

W. A. Arrindell et al.
Phobic Dimensions

label that was attached to a factor and the content of the different items contained by that factor. Thus, for only 3.6% of the 194 factors was some discordance observed in this regard. This discordance was manifested in one of three forms: the factor name referred to a specific main category while (a) the majority of the items actually reflected domain content pertaining to another category; alternatively, (b) the items were too heterogeneous in content to be classified under the category to which the factor label was actually pointing; or, finally, (c) although the items that made up a specific factor were heterogeneous in nature and reflected at least two of the measuring aspects of the major categories, the different elements had another major aspect in common. For example, the factors “Violations of societal norms” (Wade, 1978) and “Morals and sex” (Rubin, Lawlis, Tasto, & Namnek, 1969) were placed under Death, injuries, etc., rather than under Interpersonal events or situations (condition a). By contrast, “Violence and body assault” (Granell de Aldaz, 1982) was put in the Interpersonal category, rather than in Death, injuries, etc. (condition a). “Confinement” (Merbaum & Stricker, 1972), rather than being categorized under Agoraphobic fears, was placed under Other fears (condition b). Similarly, “Morbid fears” (Boynton, 1975) and “Drowning” (Harris, 1972) were here classified under Other fears, rather than under Death, injuries, etc. The “Contamination, violence and sex” factor (Arrindell & Zwaan, 1982), while referring to three different elements related to the major categories, clearly reflected a threat to physical health because of possible injury or contamination due to exposure to stimuli (small animals or insects, individuals, places or objects) that are associated with violence, dirt or lack of cleanliness, and was thus placed under the category Death, injuries, etc. (condition c).

The 194 factors were distributed as follows across each of the categories: 62 (32%) referred to Interpersonal events or situations, 58 (29.9%) dealt with matters of Death, injuries, illness, blood or surgical procedures, 31 (16%) had to do with Animal fears, and 27 (13.9%) were associated with Agoraphobic fears. Only 16 factors (or 8.2%) could not be included under any one of these four types.

In considering whether a fear measure contained items that could reasonably give rise to one or more of the major factors considered in the present survey, it was found that all studies (100%) obtained one or more factors (range: 1–3) related to Interpersonal events or situations (excluding the study by Dixon et al., 1957). In addition, all studies (100%) identified one or more factors (range: 1–5) that had to do with Death, injuries, illness etc. Close to nine out of ten studies (i.e., 22 out of 25 or 88%) produced either one or two factors related to Animal fears (excluding that part of the data analysis in the study by Arrindell et al., 1984, in which the FQ was used), while three out of four (i.e., 18 out of 24 or 75%) yielded one or more
(range: 1–3) Agoraphobic-like factors (excluding the analysis carried out by Kirkpatrick & Berg, 1981). Of the 27 factors associated with Agoraphobic fears, over half (16 or 59%) represented classical (C) types.

GENERAL DISCUSSION

The findings presented in this review indicate that slightly above 90% of all fear dimensions surveyed in the literature can be classified under one of four types: (I) Interpersonal events or situations (100% of all studies offering the possibility of obtaining such a factor), (II) Death, injuries, illness, blood and surgical procedures (100%), (III) Animals (88%), and (IV) Agoraphobic (75%). This is the more interesting since comparisons between studies were considerably hampered by several uncontrolled determinants of factor structure such as the number and variety of fear items, the number of factors extracted, the method of analysis, and sample characteristics (e.g., Hallam & Hafner, 1978). Two related questions that remain, however, are: (1) Are the (major) dimensions identified as a function of the choice of items (Kirkpatrick, 1984; compare Merckelbach, 1989, pp. 25–26), which latter overlap at least to some extent across measures (see, for example, Geer, 1965; Wolpe & Lang, 1964, 1977) and across most studies considered here? And, (2) how representative is the descriptive system of fear concepts presented in this study of the potentially existing pool of fear descriptors?

Dealing with the first question, while it is true that no fear dimension can be described if there are no items that directly refer to the relevant construct contained in an instrument, the idea, often heard from the critics of factor analysis, that what one puts into a factor analysis should also necessarily come out of it, has proved to be erroneous, as Eysenck and Eysenck (1985, pp. 24–26) have illustrated. For example, they have noted that the literature on factor analysis shows that traits believed to be univocal (that is, to be made up of items measuring one single concept) have often been demonstrated in later analyses to break up and to recombine in different ways. The Eysencks discuss the evidence showing, for instance, that:

"Cattell's 16PF scale, which allegedly consists of 16 source traits that form separate and univocal measures, has not been found to give rise to such factors in anything like the same form by later investigators. Still worse is the fate of nonfactorial scales, such as the MMPI ... each of (which) ... is in fact made up of items belonging to many different factors, and none of the scales is unifactorial in any real sense. Hence quite clearly psychologists, even when using fairly sophisticated methods of putting into the factor analysis what they hope to get out of it, are not very successful in doing this" (1985, p. 26).

Similar observations can be made in the area of fear assessment itself where Wolpe and Lang (1964), in the presentation of their 76-
item FSS-III for clinical use, noted that the stimuli are distributed into six, albeit arbitrary and in no sense definitive, subclasses: Animal, Social or interpersonal, Tissue damage, illness and death, and their associations, Noises, Other classical phobias, and Miscellaneous. While the first three factors have been repeatedly observed following the factor analyses of stimuli contained by the FSS-III or its variations, the other three types rarely occur or have provided items that have been combined in different ways to produce clinically more relevant categories than the ones hypothesized. Thus, in the present review, a Noise factor was found in only three out of 25 studies or in only three out of 194 dimensions (approximately 2%). Moreover, the Wolpe and Lang (1964) a priori factor of Social or interpersonal fears has been found to break down into different components, for example into Social evaluation and Social interaction (cf., Tasto, 1977) or into the three dimensions of Social anxiety, Cognitive or negative evaluation and Social interaction (Oei et al., 1987). Conversely, inspection of the relevant items indicates that the components of the a priori categories termed Other classical phobias and Miscellaneous by Wolpe and Lang (1964) have recombined to produce the Agoraphobia factor described by Arrindell (1980).

The second question can be reformulated as follows. (a) How exhaustive is the pool of stimuli from which dimensions are derived; and (b) are there any further major dimensions beyond the four identified in the present study? For examining this issue there are at least two procedures, each of which could appropriately be pursued in future investigations.

Firstly, there is the classic procedure used by Means (1936), perhaps the pioneer in collecting fear stimuli by means of a self-report inventory. Means prepared a fear schedule from lists of stimuli collected from a very large sample of subjects (Ss) (1000 Alabama college females). Specifically, she requested each S "to turn in . . . a list of fears which is to include everything you are now afraid of, even though you are but slightly affected by some of the things you mention . . ." (Means, 1936, p. 291). In order to determine when the collection had more or less covered the field of possible stimuli, the thousand records were divided into twenty equal groups, and Means recorded, for each group of fifty, the number of new fear stimuli turned in. The thousand records yielded 490 fear stimuli, 427 of which were contributed by the first ten groups. After eliminating duplications, the revised list, upon which the schedule was based, contained but 349 stimuli. In the schedule, Means (1936) classified the stimuli into the following rough groups: "Animals; Insects; Sorts of people; Natural things; Movements; Noises; Chemicals; Diseases; Afflictions; Painful stimuli; Death as follows; Certain relationships; Concerning loved ones; Groups of people; Supernatural; Emotions and attitudes; Following conditions; Own inadequacy; Miscellaneous" (p. 292). In the next stage,
Means (1936) re-administered the schedule to another sample of 1000 college women, requesting Ss to add fear stimuli not already included in the schedule. As a result, only two further stimuli were found (p. 301). Given a representative pool of fear items with acceptable P-values, at this point it would have been worthwhile to carry out a factor analysis to uncover the representative set of factors for female college students. Unfortunately, no factor analysis was carried out by Means (1936). Interestingly, while the total number of stimuli (n=351) reported by Means (1936) was more than twice as large as the largest pool used in the present study, namely 161 (Seidenstücker & Weinberger, 1978), the difference in the number of a priori categories proposed by Means (19) and the number of empirically-derived factors in the Seidenstücker and Weinberger study (9) does not appear to be particularly marked, taking into account the number of potential empirical factors underlying Means's pool of correlated items being presumably considerably less than the number of a priori categories themselves, given the rule of parsimony (e.g., Walkey, 1983) and the apparent overlap between specific a priori categories (e.g., Diseases, Afflictions, Painful stimuli, Death).

The second procedure is one which has been used for discovering a descriptive taxonomy of the subject matter of personality psychology. One starting place for a shared model has been the natural language of personality description. John (1990) describes the historical background of various psychologists using natural-language dictionaries as a source of attributes for a scientific taxonomy. This work, beginning with the extraction of all personality-relevant terms included in unabridged dictionaries (such as Webster's), has been generally guided by the "lexical" approach (see John, Angleitner, & Ostendorf, 1988), which posits that most of the socially relevant and salient personality characteristics have become encoded in the natural language. The personality vocabulary contained in the dictionaries of a natural language thus provides an extensive yet finite set of attributes, including those that the people in the language community have found particularly important and useful in their daily interaction with each other (John, 1990). Similarly, in the area of research considered here, using an unabridged dictionary, a listing could be made of all objects, events, organisms, experiences, and situations that may be associated with fear or other unpleasant feelings, the stimuli classified on conceptual grounds into a priori categories, and the ratings of those stimuli factor analyzed to provide a generally accepted taxonomy of fear descriptors. While a gargantuan task, such a procedure has proved successful in the area of personality research and testing in providing a systematic framework for distinguishing, ordering, and naming individual differences in people's behavior and experience (see Brokken, 1978; John, 1990).
Phobic Dimensions

For the time being, it may be concluded that there are four major categories of self-assessed fears that are of theoretical and practical importance, testifying to the fact that the sources of phobic fear constitute a very restricted sample of (potentially) phobic stimuli, that is, phobias are related to a non-arbitrary (i.e., non-random) set of situations (e.g., Eysenck, 1987). However, it should be borne in mind that each major category could contain two or more first-order type factors. Thus, the dimensions summarized in Table 2 refer to general classes. For example, the factors relating to Death, injuries, illness, blood and surgical procedures and Interpersonal events or situations refer to general classes of fear reactions that are evoked by threats to physical integrity and interpersonal functioning, respectively (Kaloupek, Schwartz, & Adler, 1986). Further studies are needed to demonstrate empirically that the different first-order concepts contained by one and the same class produce, at a higher level of abstraction, the corresponding higher-order dimension.

Based on visual cross-study comparisons, the consistency of the findings suggests that, despite several uncontrolled determinants of factor structure, the relevant dimensions of fear are relatively constant both within samples and across sample types and nationality. A small number of studies using a confirmatory approach have demonstrated that when one determinant of factor structure is varied at a time (i.e., instrument, sex, age, nationality, or sample type, e.g., patient versus normal), the first-order factors that correspond with the major four classes aforesaid appear to possess excellent invariance characteristics (Arrindell, 1980; Arrindell & van der Ende, 1986; Arrindell et al., 1984; Arrindell et al., 1990). These observations of factor invariance and that of factor replicability (Harris, 1972; Seidenstücker & Weinberger, 1978) gave rise to the suggestion that such factors reflect fundamental human adaptive concerns (e.g., Marks, 1987; Ohman, Dimberg, & Öst, 1985). That is, one could argue, as for example Eysenck (1987) has done, that the well-circumscribed phobic fears derived from factorial analyses support the argument that genetically "prepared" learning plays a crucial role in the origins of fears and phobias. Proponents of this "preparedness" interpretation (e.g., Marks, 1987; Öhman, 1986; Seligman, 1971) argue that aversive learning experiences (e.g., classical conditioning) give rise to phobias to the extent that these experiences pertain to evolutionarily relevant cues. Fear and avoidance of such cues would have conferred an evolutionary advantage. As a result of natural selection, fear and avoidance of these cues would have become genetically coded in the form of a learning mechanism. During an even mildly aversive confrontation with an evolutionary relevant (i.e., formerly survival relevant) cue, this genetically prepared learning mechanism would allow for the fast acquisition of a phobic fear. The evolutionary component or function in this type of learning would explain why relatively invariant
types of phobias can be found across studies.

More specifically, it has been suggested that the evolutionary function of social fears is to establish social hierarchies (e.g., Öhman & Dimberg, 1984). Seen from this perspective, social fears would promote social order and group cohesiveness. As for fear of blood and injury, researchers have drawn parallels between the vaso-vagal reflex commonly found in blood phobics and death-feigning or tonic immobility observed in fearful animals (e.g., Connolly, Hallam, & Marks, 1976). Some authors suggest that the vaso-vagal reflex in blood phobics has an adaptive function: “If injured, the bradycardia and hypotension may reduce the amount of blood lost, thereby enhancing survival” (Thyer, Himle, & Curtis, 1985, p. 453). Animal fears have been related to a “predatory defense system”, the function of which is to promote avoidance of dangerous animals (e.g., Öhman, 1986). Finally, agoraphobia has been interpreted as a phylogenetically shaped fear of large, open spaces and extra-territorial areas (Seligman, 1971; Marks, 1987; Van den Hout et al., 1990).

In summary, then, a number of authors have proposed scenarios explaining the evolutionary advantage of social fears, blood and injury fears, etc. But whereas these scenarios may, at first sight, sound plausible, their empirical verification has proven to be extremely difficult. There have been attempts to establish the tenability of the preparedness hypothesis by analyzing the records of phobic patients (De Silva, Rachman, & Seligman, 1977; De Silva, 1988; Zafropoulou & McPherson, 1986). By and large, these studies have reported that a large majority of clinical phobias do, indeed, pertain to stimuli that are, according to independent judges, evolutionary relevant (but see Merckelbach, Van den Hout, Hoekstra, & Van Oppen, 1988). A major drawback of these studies is their circularity. That is to say, the preparedness hypothesis was introduced to account for the selectivity of phobias. However, the clinical studies cited above redefine this selectivity in terms of evolutionary scenarios and subsequently take this redefinition as prima facie evidence for prepared learning.

Thus far the most convincing evidence for the notion of prepared learning has come from the laboratory of Öhman and his co-workers (see review by Öhman, 1986). In an impressive series of experiments, these investigators showed that the conditioned autonomic responses (e.g., electrodermal responses) of normal subjects extinguish much more slowly with slides depicting evolutionarily relevant stimuli (e.g., threatening social cues such as angry faces; snakes) than with slides depicting evolutionally neutral stimuli (neutral faces, flowers). This finding sustains, of course, the idea that humans are endowed with a prepared learning mechanism that can readily be mobilized during aversive confrontation with social cues or potentially dangerous animals. Unfortunately, various studies conducted outside Öhman’s laboratory were unable to replicate or cross-validate this
finding (see reviews by McNally, 1987; Merckelbach, Van den Hout, & Van der Molen, 1989). Moreover, the relevance of the Öhman et al. studies is restricted to the domain of animal and social fears. With regard to the alleged preparedness of blood and injury fears and agoraphobia, little or no experimental work has been done. Some investigators have sought to apply Öhman-like paradigms within the context of agoraphobic cues (e.g., slides of typical agoraphobic scenes; Kartsounis & Turpin, 1987) or hyperventilation (Van der Molen, Van den Hout, Merckelbach, Van Dieren, & Griez, 1989). Yet, the results of these isolated attempts were either disappointing (Kartsounis & Turpin, 1987; Van der Molen et al., 1989) or difficult to interpret (Van den Hout et al., 1990).

Experimental studies concerned with the prepared basis of blood and injury fears have not yet been published. The fact remains, however, that their frequent occurrence in the general population (e.g., Graham, 1961) suggests that there is a prominent evolutionary component in this type of fear.

To sum up, whereas a considerable number of authors have referred to the idea that social fears, blood and injury fears etc. are genetically prepared, there is no compelling evidence to support this idea. It is also possible that in some of the studies where there have been positive findings, evolutionary relevance has been conflated with emotional salience, that is, not only were the control stimuli supposedly of less evolutionary relevance but also they were less emotionally charged or intense in quality. Still, it should not be overlooked that the problem of how to test biological hypotheses with psychological paradigms may, at least in part, be responsible for this what Rachman (1990b, p. 70) considers to be an unhappy state of affairs. In a recent paper, Rachman (1990a) concludes that:

"The dismissal of the (preparedness) theory on grounds of the disappointing laboratory findings would be premature, and it may be the laboratory paradigm that is weak, not the theory. The plausibility of the concept has been weakened but not seriously damaged" (p. 20).

On the other hand, it could be argued that up to a point it is for the proponents of a theory to find support for it and not for others to attempt to prove its lack of validity: the theory remains weak until it is supported by the evidence.

For scientists who are willing to fight for support of the preparedness theory, Rachman advocates that:

"More powerful stimuli and more appropriate measures of fear responding are needed before the theory can be subjected to rigorous testing. The prepared phobias which are the subject of the theory are intense, vivid, resistant, and persisting fears, and it is on such fears that the theory must be assessed" (1990a, p. 20).

Two final points should be addressed. The first concerns the fact that
the present review did not focus on factor analyses based on data from children, adolescents (e.g., Scherer & Nakamura, 1968; Guarnaccia & Weiss, 1974; Ollendick, 1983; Ollendick, King, & Frary, 1989) or the elderly, so that further studies will have to deal with the generalizability of the present findings to such age groups. The second point has to do with the observation that as many as one third of the studies reviewed here suffered from methodological shortcomings and/or deficiencies in technical reporting of some sort. Recent relevant sources relating to the application of exploratory factor analysis (Ford et al., 1986; Kline, 1986; Rust & Golombok, 1989; Velicer & Jackson, 1999a, b) provide recommendations regarding technique and the presentation of results in factor analytic studies. Consultation of and adherence to the guidelines that are provided in these sources would dramatically improve both the quality of the applied factor analysis literature and the validity of the information obtained from applied factor analysis research.

Acknowledgement — This monograph was written while the first author was affiliated to the Department of Psychiatry of the Vrije Universiteit, Amsterdam, The Netherlands. Thanks are due to Karin Coorengel for secretarial assistance.

REFERENCES


Phobic Dimensions

(AZUV) en Wolpe en Lang’s Fear Survey Schedule (FSS-III). Nederlands Tijdschrift voor de Psychologie, 37, 225–239.


Phobic Dimensions


Phobic Dimensions


APPENDIX

Notes Pertaining to Table 1

1. The study, in fact, included Ss at each of three age levels: 11 years, 17 years, and senior citizens (mean age of the males, 70.8; mean age of the females, 68.5 (SDs: 6.2 and 7.7 years, respectively)). Russell (1967) pointed out that appropriate factor naming required that factor loadings be viewed from the standpoint of the particular age level. Only the results of the High School Seniors are considered here.

2. Although the total percentages were not specified, these can be computed from the matrices of factor loadings which were published in the relevant article.

3. Sample B served as the cross-validation sample.

4. Based on the findings of a previous study (Wilson, 1967), the authors administered an open-ended questionnaire to 240 students requiring them to list any objects or events that caused them undue fear or anxiety. Only unreasonable fears were to be listed. The 18 most frequently reported fear stimuli from this study were used in Wilson and Priest (1968).

5. Six factors with eigenvalues ≥ 1.00 were obtained, accounting for 56.28% of the total variance. The variance pertaining to each of the rotated factors was described as follows: 30.73% (1), 24.56% (2), 26.10% (3), and 18.61% (4). The specific eigenvalue for each factor was not reported.

6. TFSI = Temple Fear Survey Inventory.

7. The male and the female samples produced 21 factors each. Only the nine largest in the male sample and the eleven largest in the female sample are reported here. The great majority of the remaining factors, termed "secondary" by Braun and Reynolds (1969), comprise less than three items with meaningful factor loadings.

8. Eight out of 12 of these factors were either "empty" (i.e. had not one item with a meaningful factor loading) or contained less than three items with a loading in excess of |. ≥ .35|. Seventeen (rather than five) factors explained 77.1% of the total variance.

9. Based on the primary sample, N = 319 (see note 10).

10. The total sample was split into two independent groups of Ss (Sample 1, N = 319; Sample 2, N = 175) and a separate factor analysis was carried out for each. Factor interpretability was considered as a function of those significant loadings that were replicated across the two subsamples.

11. Without reporting the actual figures, Van der Toorn and Bremer (1971) claimed that similar factors were obtained across the sexes. They point out that the first three factors reported in the table explained the same amounts of the total variance for male as for female patients.
12. The FSS was administered on three occasions (see note 13). Specific percentages for each testing occasion were not reported. However, the following eigenvalues were given for occasion I for the first five factors: 11.72, 2.84, 2.34, 2.08, and 1.54. The corresponding figures for occasion II were 11.57, 2.89, 2.19, 1.63, and 1.21, while those pertaining to occasion III were 13.29, 2.72, 1.86, 1.54, and 1.18.

13. The FSS was administered on three occasions. The second administration was carried out approximately six weeks following the first. The third assessment of the sample occurred approximately six weeks after the second administration and three months after the initial testing. Factor analyses were carried out on the responses of the 366 Ss in the first occasion sample for whom data were available over all occasions. The replicability of the identified factors was investigated over the three occasions of measurement. To determine the degree of invariance of these factors, a factor matching routine was employed to obtain the best match of factors over occasions. This procedure yields a solution (factor loading pattern) over measurement occasions whose corresponding factors exhibit maximum similarity of factor loading patterns. The extent of factor invariance was computed by means of Harman’s coefficients of congruence, with coefficients exceeding .80 being indicative of acceptable match over occasions. Comparing occasions one and two, the first four factors met this criterion. The comparison of occasions two and three indicated that all five factors were invariant. But when the degree of invariance over the longest period of time, represented by the comparison of occasions one and three, was examined, only the first three factors had coefficients of congruence in excess of .80. Harris (1972) concludes that “it is reasonable to infer that the replicability of these factors is, in part, dependent upon the amount of time allowed to elapse between measurement occasions.” (pp. 61–62).

14. IFSI = Israeli Fear Survey Inventory.

15. Part of the findings reported in the Holmes et al. (1975) article was also published in Rothstein, Holmes, and Bobbitt (1972).

16. Stratton and Moore (1977) submitted the same set of items to four methods of analysis: principal components analysis (PCA) with Varimax rotation, PCA with Oblimin rotation, Principal Factor analysis (PFA) with Varimax rotation, and PFA with Oblique rotation. All 23 factors with eigenvalues of at least 1 were rotated to simple structure. Stratton and Moore pointed out that the factor matrices obtained under PCA and PFA were compared by means of a computer program developed to determine factorial similarity and were found to be essentially identical. The similarity coefficients, however, were not reported. Similarly, they claimed that comparison of the rotated factor matrices obtained under each of the four methods of analysis also revealed no major differences (again, no coefficients of similarity were given). Moreover, Stratton and Moore wrote that the factors (PFA, Varimax) obtained for the total, the male and the female samples were highly similar. (For both the male and the female samples, 25 factors were extracted with eigenvalues of at least one.)

17. The number of latent roots greater than 1.00 exceeded the maximum number of ten factors.

18. Fairly homogeneous non-phobic symptom dimensions have been placed between parentheses.

19. \(N = 55\) (see Hallam & Hefner, 1978, p. 4).

20. \(N = 80\) (see Hallam & Hefner, 1978, p. 4).

21. The replicability of the factors was determined in an independent sample of students \((N = 178)\). Replicability of factor structure was concluded from the high \(Q\) coefficient of .91 (see Seidenstücker & Weinberger, 1978, p. 82) which was obtained by intercomparison of the rotated matrices of the loadings obtained with the original and replication samples.

22. To determine factor replicability, Wade (1978) assigned Ss randomly to either of two groups \((N = 200\) each) and carried out separate factor analyses (principal factors with squared multiple correlations in the diagonals followed by Varimax rotations) on each group. Wade (1978) noted that the results revealed a high degree of internal consistency. Factor score correlation coefficients were computed from standardized
factor score matrices of separate analyses on the split sample. Relationships between pairs of factors ranged from .78 for the first factor to .60 for the fifth factor.

23. Eleven pairs of twins were specially selected because one of the twins of each pair had been hospitalized for a neurotic disorder. The remaining pairs consisted of a relatively unselected sample. Over 90% of the total sample comprised non-psychiatric Ss obtained through the National Twin Register and the Norwegian Register for Inherited Disorders, both of the University of Oslo, Norway.

24. The factor structure that was interpreted for the total sample of Ss had to be invariant across sex.

25. The confirmatory procedure was applied to the solution interpreted for the pooled samples of males and females only (see note 24).

26. In the study itself, the number of items was not given. It is assumed here that this corresponds with the actual number reported by Geer (1965), who developed the FSS-II.

27. At the data collection phase, the Ss had responded to a larger fear scale containing 133 items. For their factor analysis, Kirkpatrick and Berg (1981) selected only those items with a mean of 3 ("little fear") or more on a 7-point scale used by Geer (1965), ranging from 1 ("no fear") to 7 ("terror").

28. Kirkpatrick and Berg (1981, p. 17) write that "the same factors emerged in oblique-rotation factor analyses performed on the entire sample and in varimax analyses performed on 50% random samples of the total N for both men and women". The statistical procedures used for examining this matter, however, were not specified.

29. Fear Questionnaire developed in the Department of Psychiatric Research of the Academic Hospital of Utrecht (Academisch Ziekenhuis Utrecht).

30. Doctor (1982) notes that "the items were drawn from clinical cases seen over a number of years" (p. 211).

31. See note 32.

32. Seven factor analyses were carried out. Scores obtained from male and female groups were analyzed separately. Responses of the total sample (N = 871) were analyzed and then divided twice (at random) into two independent samples ranging in size from 318 to 553. The resulting factor matrices were rotated using both the orthogonal and the oblique method. Following this procedure, Granell de Aldaz (1982) decided to take the results obtained with orthogonal rotation as a guide, and to seek to establish if there was any overlap with the latter (exploratory analysis). Data from each of the subgroups were analyzed separately, and "only those factors that proved to be consistent in at least four of the seven orthogonal analyses, and that also appeared in the oblique rotation, were retained" (1982, p. 320).

33. Item no. 22 was excluded from the FSS form that was used in the British sample of students.

34. The sample is the same as the one reported in Kartsounis et al. (1983).

35. The "perfectly-congruent weights" and "multiple group" methods are described in Arrindell et al. (1984). For each of the six samples (A through F), it was determined whether an originally obtained structure (the 5-factor solution reported in Arrindell, 1980) could be retrieved/cross-validated in males, females, and the pooled sample of male and female Ss.

36. The FSS used in the Hafner and Ross (1984) study is identical to the one described in Hallam and Hafner (1978), with the exception of one item which was eliminated, namely "fear of a specific illness".

37. See note 18.

38. Two techniques of factorial invariance were used: the Tucker ϕ method and the method of "perfectly-congruent weights", both leading to the conclusion that there is clear evidence of factor constancy.

39. Oei et al. (1987) reported that factor analysis performed separately on the clinical and non-clinical groups revealed similar structures. Neither the method that was used nor the criteria for factor similarity were given.

40. Brown and Crawford (1986) carried out separate analyses for males, females, and
the total group of students and compared factor loadings across analyses by means of visual inspection.

41. Percentages are reported for the total sample only and have been calculated from the eigenvalues.

42. Factor invariance was determined across nations (Canadian data vs. Dutch target ratings) and, within the pooled Canadian sample, across sex.