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## **The structure of common fears: comparing three different models**

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## **Abstract**

Previous studies showed discrepant findings regarding the factor structure of common fears. The purpose of the present study was to expand on these findings and to contribute to the development of a descriptive framework for a fear classification. Using data from the Dutch general population ( $n=961$ ; 50.9% women), an exploratory factor analysis was performed to delineate the multidimensional structure of 11 common fears previously used in a factor-analytic study by Fredrikson, Annas, Fischer, & Wik (1996). A second, independent sample ( $n=998$ ; 48.3% women) was used to confirm the newly derived model by means of confirmatory factor analysis. In addition, the model was tested against the DSM-IV-TR model, and a model found earlier by Fredrikson et al. (1996). Although support was found for a 3-factor solution consisting of a blood-injection-injury factor, a situational-animal factor and a heights-related factor, confirmatory factor analysis showed that this 3-factor model and the DSM-IV-TR 4-factor model fitted the data equally well. The findings suggest that the structure of subclinical fears can be inferred from the DSM-classification of phobia subtypes, and that fears and phobias are two observable manifestations of a fear response along a continuum.

Keywords: fears • phobias • DSM • factor structure • classification

## **Introduction**

Fears are fairly widespread in the normal population, with fear of animals as the most frequently reported fears (e.g., Agras, Sylvester, & Oliveau, 1969; Depla, Ten Have, van Balkom, & de Graaf, 2008). The wide variety of fears has motivated researchers to classify fears in categories or hierarchical structures in order to provide a descriptive framework for classification (e.g., Arrindell, Pickersgrill, Merckelbach, Ardon, & Cornet, 1991; Staley & O'Donnell, 1984). Such a framework would raise the possibility of categorization and individual-based designation of type of fear and may therefore be important to aid research and assessment. In addition, identifying the specific situations an individual fears and avoids, as well as the severity of his or her symptoms, can contribute to the development of appropriate treatment strategies. Such information may particularly be important since some phobic conditions differ in their response to a confrontation with a phobic stimulus. For example, blood-injury-injection phobia appears to be uniquely associated with fainting in phobic situations, and has been found to be especially responsive to an intervention that is tailored to its physiological profile (i.e., applied tension; LeBeau, Glenn, Liao, Wittchen, Beesdo-Baum, Ollendick & Craske, 2010). Although fears are by definition lower in clinical severity than phobias, highly fearful individuals meet at least some criteria for specific phobia and therefore they may still be in need of straightforward and effective, exposure-based, interventions to alleviate the severity of their distress and avoidance patterns.

Studies which have examined the factor structure of common fears demonstrate discrepant findings, with the number of fear factors or clusters derived as being the best interpretable solution varying between two and five (e.g., Arrindell *et al.*, 2003; Cox, McWilliams, Clara, & Stein, 2003; Curtis, Magee, Eaton, Wittchen, & Kessler, 1998). A drawback of a number of these studies is that they relied mainly on fear inventories like the Fear Survey Schedule (FSS) (e.g., Arrindell *et al.*, 2003; Arrindell *et al.*, 1991; Mellon,

2000). The usefulness of the FSS in the classification of fears can be questioned as the FSS does not seem to assess specific or circumscribed objects or situations *per se*. Items involving fears of interpersonal events and situations (e.g., being criticized) may in fact be manifestations of social phobia, while items about fears related to travel or transportation are likely to be symptoms of agoraphobia or panic disorder. Further, measures like the FSS include fears that are difficult to consider as being irrational (e.g., an aversion to dead bodies may not be dysfunctional), and contain fears pertaining to emotions (e.g., feeling rejected by others), and to unconditioned stimuli (e.g., looking foolish, losing control) rather than conditioned stimuli (e.g., insects, noises; Arrindell *et al.*, 2003; Marks & Mathews, 1979; Wolpe & Lang, 1977). Thus, questionnaires originally devised as clinical tools to provide therapists with a brief overview of clients' fears, like the FSS, may not be suitable as a foundation for developing a conceptual framework of fears or phobias.

Another approach to study the structure of feared situations is the inclusion of items referring to objects and situations which correspond with the five main categories or subtypes of specific phobia: animal type (e.g., phobias of spiders and dogs), natural-environment type (e.g., phobias of heights and water), situational type (e.g., phobias of enclosed spaces and flying), blood-injury-injection type (e.g., phobias of receiving an injection or seeing blood) and a miscellaneous category named 'other type' (e.g., phobias of choking and vomiting) retained in the DSM-IV-TR (American Psychiatric Association, 2000). However, these studies are scarce and provide inconsistent results. For example, Cox and his colleagues (Cox *et al.*, 2003) who used data from the National Comorbidity Survey identified five different fear factors within a set of 19 common fears, of which three relate to other anxiety disorders within DSM (i.e., agoraphobia, speaking fears, fears of being observed). Of the two factors that did correspond with the phobic division within DSM-IV-TR, one involved a fear of

heights or water, but the other consisted of a broad constellation of ‘threat fears’ (i.e., snakes/animals, storm/thunder, blood/needles, being alone, closed spaces; Cox *et al.*, 2003). Until now, only one study specifically attempted to determine whether the structure of fears possess commonalities with the DSM-IV-TR division of specific phobias (Fredrikson *et al.*, 1996). In this study, carried out by Fredrikson and his colleagues, a set of 10 of the most frequently reported specific fears (e.g., Agras *et al.*, 1969; Curtis *et al.*, 1998; Depla *et al.*, 2008) was used. The investigators, who included a randomly selected sample of 702 participants of the Swedish city of Stockholm, found support for a classification of fears comprising three factors: a situational factor (thunder, enclosed spaces, darkness, flying and heights) an animal factor (spiders and snakes) and a mutilation factor (injections, dental treatment, injuries (Fredrikson *et al.*, 1996).

Remarkably, none of the factor analytic studies that have been conducted thus far, and employed a series of common fears, found support for a structure similar to that of the currently recognised classification of phobia subtypes within the DSM-IV-TR. Only corroboration for the existence of some kind of blood-injury-injection fears cluster was found (e.g., Arrindell *et al.*, 2003; Cox *et al.*, 2003; Fredrikson *et al.*, 1996), while less conclusive evidence has been found for a category of situational fears (e.g., Curtis *et al.*, 1998; Muris *et al.*, 1999; Taylor, 1998), and natural-environment fears (e.g., Cox *et al.*, 2003; Curtis *et al.*, 1998).

Given that previous endeavors aimed at developing a descriptive framework for fear classification failed to provide conclusive results, the purpose of the current study was to delineate the multidimensional structure of a set of 11 common fears of which ten were previously used by Fredrikson *et al.* (1996). This was done using exploratory factor analysis (EFA) performed on data from the Dutch general population, while a second, independent sample was used to confirm the newly derived model by means of confirmatory factor

analysis (CFA). Finally, the model was tested against two other models: the DSM-IV-TR model, which distinguishes four factors excluding the subtype ‘other type’, and the model found by Fredrikson and his colleagues consisting of three discernable factors (a situational, an animal, and a mutilation type).

## **Methods**

### *Assessment*

A questionnaire booklet, containing a number of self-report measures was used. In the first part, data on demographic variables (i.e., age, sex, marital status and country of birth) were collected. The second part of the questionnaire consisted of 11 questions pertaining to the presence or absence of 11 common fears (i.e., fear of injections, snakes, spiders, thunder, enclosed spaces, physical injuries, darkness, flying, heights, blood and dental treatment). These fears were adopted from an earlier study conducted by Fredrikson et al. (1996). Fear of blood was added as this is a common, and in some ways exceptional, fear (Le Beau et al., 2010). Each of the 11 fears was presented on a different page and each time participants were asked to complete a corresponding visual analogue scale (VAS; “How much fear does this evoke?”), ranging from 0 (‘no fear at all’) to 100 (‘terrified’), but only in case they first indicated that fear to be present. If the participant indicated the fear to be absent, a VAS score of zero was imputed.

### *Sample selection*

Two independent samples were taken from the Dutch population. All potential participants ( $n=1522$ ) in Sample I were travelling by means of public transport (trains and intercity buses covering tracks between all major cities across the Netherlands). Of the 1522 persons approached, 965 agreed to participate. Four questionnaires were incomplete, leaving 961

questionnaires for subsequent analyses. Reported reasons for refusal were: not interested ( $n=165$ ), being busy with something else ( $n=103$ ), insufficient command of the Dutch language ( $n=92$ ), leaving the train or intercity bus in a moment ( $n=60$ ), being too tired ( $n=49$ ), age under 18 ( $n=48$ ) or claiming never to feel scared ( $n=40$ ).

All potential participants ( $n=1446$ ) in Sample II were visitors of a wide range of public places (i.e., supermarkets, cafés with terraces, parks and shopping malls) in several parts of the Netherlands. Of the 1446 approached, 1002 people agreed to participate, three questionnaires were completed by participants under 18 and one was incomplete, leaving 998 questionnaires for subsequent analyses. Reported reasons for refusal were: being busy doing something else ( $n=243$ ), not interested ( $n=116$ ), insufficient command of the Dutch language ( $n=39$ ), age under 18 ( $n=37$ ), claiming never to feel scared ( $n=6$ ), feeling ill ( $n=2$ ) or forgot reading glasses ( $n=1$ ).

### *Procedure*

Identical procedures were used in both samples. Potential participants were approached by one of the three advanced graduate students who invited the person to participate in a study on fears. Verbal informed consent was obtained in all cases. Those who agreed to participate were handed the questionnaire booklet, received standardized verbal instructions and were asked to complete the questionnaires. Data were collected with the understanding and consent of each subject, and according to the ethical principles described in the Declaration of Helsinki.

### *Data analysis*

The distributions of the demographic variables, prevalence of fears and severity ratings of fears of the participants in the two samples were compared using Chi-square tests for nominal



data and *t*-tests for continuous data. In addition, where appropriate Cohen's *d* was presented. An exploratory factor analysis (EFA), with promax rotation (Hendrickson & White, 1964) was conducted to assess the factor structure in the severity of fears in Sample I. Promax rotation allows for factors to be correlated, is suitable for large datasets and has advantages over alternative oblique methods in terms of the general robustness of the solution it provides (Field, 2005; Loehlin, 1998). The EFA was conducted on the severity ratings of the 774 participants who had indicated being fearful of at least one of the stimuli in order to reduce the loss of variance in severity scores.

Subsequently, the model resulting from the EFA (Model I) was validated in Sample II using a confirmatory factor analysis (CFA). Furthermore, for comparison reasons two other models, the DSM-IV model (Model II) and the Fredrikson et al. (1996) model (Model III) were fitted using data from Sample II as well. In Table 1 a detailed description of the models is presented. As with Sample I, analysis was conducted on the severity ratings of the 804 participants who had indicated being fearful of at least one of the situations. Hence, only those who endorsed at least one fear were included in the CFA. We used Lisrel 8.80 with maximum likelihood (ML) as the method of estimation. A number of indices were applied to test goodness of fit of each model. First, the  $\chi^2$  to degrees of freedom ratio ( $\chi^2/df$ ) was used. For an acceptable model fit  $\chi^2/df$  should be between 2 and 3 and for a good model fit between 0 and 2 (Schermelleh-Engel et al., 2003). The  $\chi^2/df$  ratio was used rather than the  $\chi^2$  test statistic because it is less sensitive to sample size (Schermelleh-Engel, Moosbrugger, & Muller, 2003). Four additional fit indices were used: the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the adjusted goodness of fit index (AGFI) and the standardized root mean square residuals (SRMR). RMSEA values ranging between 0 and 0.05 indicate a good fit. A CFI of 0.97 or higher indicates a good fit and a CFI between 0.95 and 0.97 indicates an acceptable fit. AGFI values range between 0 and 1, with

values near 1 indicating an acceptable to good fit and SRMR values ranging between 0 and 0.05, indicating a good fit (Schermelleh-Engel et al., 2003). These indices are less sensitive to large sample sizes than other indices. Subsequently, the expected cross validation index (ECVI), the Akaike's Information Criterion (AIC) and the consistent Akaike's Information Criterion (CAIC) were used, allowing the non-nested models I and III to be compared. For a model to be preferred, the values of these measures must be smaller than those of the comparison model. Finally, Model II was compared with Model I and Model III, by means of the log-likelihood difference test ( $\Delta\chi^2$ ) to compare the fit of two nested models.

[INSERT TABLE 1 ABOUT HERE]

## **Results**

### *Participants*

In Sample I ( $n=961$ ) 50.9% were women. Age varied from 18.0-93.0 years ( $M=32.0$ ,  $SD=15.4$ ). In this sample 34.2% was not involved in a relationship, 32.3% was married or living together, 28.6% was dating, and 4.9% was either divorced or widowed. The distribution of country of origin showed that 84.7% was Dutch, 2.7% was Surinamese, 1.9% was Turkish, 1.2% was Antillean, 1.2% was Moroccan and 8.3% was from another descent. Of the participants 80.5% endorsed and 19.5% did not endorse at least one fear. A comparison between participants who reported at least one fear and those who reported no fears at all revealed that women were significantly more likely to report at least one fear than men did [ $\chi^2(1)=29.20$ ,  $p<0.001$ ]; there was no relation with marital status [ $\chi^2(5)=7.21$ ,  $p=0.205$ ] and origin [ $\chi^2(1)=2.48$ ,  $p=0.120$ ].

In sample II ( $n=998$ ) 48.3% were women. Age varied from 18.0-89.0 years ( $M=39.5$ ,  $SD=15.4$ ). In this sample 64.3% was married or living together, 16.9% was not involved, 13.0% was dating, and 5.8% was either divorced or widowed. The distribution of country of

origin showed that 91.7% was Dutch, 1.4% was Surinamese, 1.3% was Moroccan, 0.8% was Turkish, 0.5% was Antillean and 4.3% was from a different country of origin. In this sample 78.8% did, and 21.2% did not report at least one fear. A comparison between participants who endorsed at least one fear and those who reported no fears revealed that men reported more often no fears than women [ $\chi^2(1)=60.90, p<0.001$ ]. Also those of a non-Dutch origin were more likely to report at least one fear than those with a Dutch origin [ $\chi^2(1)=4.78, p=0.029$ ]. No relation with marital status [ $\chi^2(5)=5.50 p=0.36$ ] was found.

#### *Comparison of the two samples*

The two samples did not differ significantly with respect to sex [ $\chi^2(1)=2.16, p=0.142$ ], however a difference was found regarding marital status [ $\chi^2(5)=220.29, p<0.001$ ], country of origin [Dutch versus non-Dutch;  $\chi^2(1)=26.04, p<0.001$ ] and age [ $t(1954)=-11.0, p<0.001, ES=-0.50$ ]. Nevertheless, the results showed no significant differences in the prevalence rates of the 11 fears between Samples I and II, with the exception of fear of physical injuries ( $\chi^2(1)=18.24, p<0.001$ ). No significant differences were found pertaining to the severity of the fears, with the exception of fear of dental treatment [ $t(475)=-3.09, p=0.002, ES=-0.29$ ]. This means that apart from some of the demographic characteristics, overall the two samples could be considered similar in terms of prevalence of fears and severity of fears.

#### *Explorative Factor Analysis (EFA) on the severity ratings of the fears in Sample I*

An EFA was conducted on the severity data of the 11 fears on the 774 participants in Sample I who had indicated to have at least one fear. Information about skewness and kurtosis, the Kaiser-Meyer-Olkin measure (0.73) and the fact that Bartlett's test of sphericity was significant ( $\chi^2=916.71, df=55; p< 0.001$ ) indicate that the data were appropriate for data analysis. This EFA resulted initially in four factors with eigenvalues  $\geq 1$  (2.48, 1.23, 1.01, and

1.00) explaining 52.2% of the variance. Inspection of the content of the four factors revealed that these were hard to interpret (see Table 2) and subsequent inspection of the screeplot indicated a three-factor solution. Therefore, a three-factor solution was tested. This three-factor solution accounted for 43.0% of the variance. Furthermore, a factor loading of  $\geq 0.30$  was defined as salient (Costello & Osborne, 2005; Thurstone, 1947). The fears of darkness, thunder, enclosed spaces and spiders had high factor loadings and the fear of snakes loaded moderately on the first factor (situational-animal factor). The fears of injections, blood and dental treatment loaded highly and the fear of physical injuries loaded moderately on the second factor (blood-injection-injury factor). Fears of heights and flying loaded highly on the third factor (heights factor) (see Table 3).

[INSERT TABLE 1, 2 and 3 ABOUT HERE]

#### *Confirmatory Factor Analysis (CFA) on the severity ratings of the fears in Sample II*

The CFAs were conducted on the severity data (Visual Analogue Scale data) of the 11 fears of the 804 participants in Sample II who had indicated having at least one fear. Three models were fitted: (a) the model which resulted from the EFA in the current study (Model I), (b) the DSM-IV model (Model II), and (c) the Fredrikson et al. (1996) model (Model III). The CFA showed that each of the fears had significant factor loadings. Furthermore, the fit statistics showed that each of the three models had an acceptable to good fit (see Table 4). Closer inspection of Model II showed two factors with high intercorrelations (0.91 and 0.94) that perhaps can be seen as one factor.

[INSERT TABLE 4 ABOUT HERE]

### *Comparison of the three models*

First, the non-nested Models I and III were compared. Without considering Model II, it was found that the values of the ECVI, AIC and CAIC were lowest for Model I (Table 5), indicating that Model I fitted the data best in comparison to Model III. However, when also taking Model II into account the AIC is lowest for this model.

Subsequently, Model I and III - being nested under Model II - were compared with Model II using the log-likelihood difference test ( $\Delta\chi^2$ ). When comparing Models II ( $\chi^2=81.37$ ,  $df=38$ ) and III ( $\chi^2=91.02$ ,  $df=41$ ) results showed that Model II fitted the data significantly better than Model III ( $\Delta\chi^2=9.65$ ,  $df=3$ ). Furthermore, results showed no significant difference ( $\Delta\chi^2=4.56$ ,  $df=3$ ) in fit between Models I ( $\chi^2=85.93$ ,  $df=41$ ) and II ( $\chi^2=81.37$ ,  $df=38$ ).

### **Discussion**

The factor analytic findings in the first sample proved to be supportive of a distinction in three categories of fears, containing a blood-injection-injury factor, a situational-animal factor and a heights-related factor. These results support previous findings indicating that blood-injection-injury fears generally differ from other fears, which resonates with their distinctive physiological profile (see LeBau *et al.*, 2010). The findings also corroborate those of Fredrikson *et al.* (1996), who found that situational fears loaded with natural environment fears. Conversely, in contrast with the findings of previous studies (Fredrikson *et al.*, 1996; Cox *et al.*, 2003; Curtis *et al.*, 1998), the fears within the situational and animal category merged into one single factor. One explanation for this finding is that people with these particular fears, display a comparable fear response, in terms of sympathetic arousal (Fyer, 1998). Another notable finding is that certain items loaded on a separate heights cluster. Yet, this finding is in line with earlier findings in that one factor contained both heights and water

items (Cox *et al.*, 2003; Curtis *et al.*, 1998). Height was also found to be part of the situational factor (e.g., Anthony, Brown, & Barlow, 1997; Curtis *et al.*, 1998; Fredrikson *et al.*, 1996). Accordingly, it could be argued that both height and flying are “absentia terra firma” and that this discriminates them from the other nine more solidly grounded fears employed in the current study (Cox *et al.*, 2003). Support for a separate cluster of fear of heights also comes from recent findings suggesting the presence of underlying physiological abnormalities (i.e., balance control) in individuals with fear of heights (Boffino *et al.*, 2009). These problems particularly seem to involve the experience of ‘height vertigo’ and difficulties in using visual information to keep postural stability (Bles, Kapteyn, Brandt, & Arnold, 1980). Thus, it could be that at least a part of the individuals with height fears do not suffer from a psychological condition *per se*, but from an innate disturbance of a physiological mechanism by which a phobic behavioral response is triggered without ever having experienced an aversive learning experience in the past.

The confirmatory factor analysis carried out on the data of the second sample resulted in an acceptable fit for the three models that were examined. However, the present data do not allow us to decide for one particular model above the other, nor do these rule out the presence of more or other layers or levels (i.e., higher-order factors) in the hierarchy of fears, such as neuroticism or social fears (Cox *et al.*, 2003; Taylor, 1998). On the one hand, it could be argued that a three-factor solution is more parsimonious, and therefore preferable, while on the other hand, the DSM model has the advantage of being developed on the basis of a considerable body of clinical experience. Because both models differ in terms of how common fears cluster, this raises the question as to whether an accurate model in describing the structure of fears can be found, or indeed even exists. This notion is in line with the fact that a separate factor of blood-injury-injection or ‘mutilation’ fears is the only stable finding across all studies, while the emergence of other factors seem to vary from study to study.

Perhaps fears are heterogeneous, rather than unitary phenomena. An example in this respect is fear of flying (Howard, Murphy, & Clarke, 1983). One study demonstrated that fear of flying consists of four different subtypes of flying phobias, that is, (1) fear of aircraft accidents, (2) fear of loss of control or social anxiety, (3) fear of airplanes, water, claustrophobia or agoraphobia, and (4) fear of heights (van Gerwen, Spinhoven, Diekstra, & Van Dijck, 1997). Thus, fear of flying might actually be the expression of a fear included within subtypes other than the situational subtype, such as fear of heights (natural-environment subtype), fear of injury (blood-injection-injury subtype), fear of loss of control (other), or even a combination of these subtypes. Another example of the lack of homogeneity within fears are fears related to the dental treatment. Individuals are inclined to avoid the dental treatment situation because of a wide variety of stimuli, including the likelihood of exposure to pain sensations, drilling in or extractions of teeth, receiving a dental injection, having a root canal treatment and 60 other potential fear-evoking objects and situations (see Oosterink *et al.*, 2008 for an overview). Hence, it still remains unclear to what extent fears within a certain subtype are similar to each other, considering the features that are thought to distinguish them from other fears (see Lipsitz, Barlow, Mannuzza, Hofmann, & Fyer, 2002).

Despite the strength of using both exploratory and confirmatory factor analyses, and two independent samples taken from the general population, some limitations are worth noting. Firstly, the current study was conducted among the Dutch population, which could limit the generalizability of the findings to other countries. Another drawback of the study may be its sample selection, where individuals within the public domain were asked for participation in the survey. Although the samples did appear to be comparable with the general population in terms of sex distribution, age and ethnicity, as reported by the Dutch Central Bureau of Statistics (CBS, 2006), the samples could still be selected with regard to

one or more parameters. For example, people with claustrophobia and serious health concerns may be under-represented in public transportation, implying a weak representativity and generalizability of the findings. Further, like any other data-gathering method, face-to-face administration also has its limitations in terms of generalizability. This method was used rather than telephone, mail or internet administration for reasons related to coverage properties (e.g., difficulties to reach low-income groups), accuracy of the screening, response rate and length of the survey/respondent burden (see Kessler & Merikangas, 2004). However, assessment of fears relies on the likelihood of participants' agreement to participate and to report on these matters. Accordingly, individuals with more fears may be more socially anxious and less likely to participate. On the other hand, as this may have been problematic in terms of reliably determining prevalence rates, it is less likely to have a negative impact on assessing the number and nature of factors represented by the fear items and their correlation.

In conclusion, the present results provide support for both a structure of fears largely reflecting the DSM-IV-TR division consisting of five discernable factors or phobia subtypes, and a simpler three factor model. Although future studies need to further test the validity and utility of the structure and the 'subtypes' of fears as obtained in the present study, the data suggest that the structure of fears could be inferred from the DSM classification of phobia subtypes, and that fears and phobias are two observable manifestations of a fear response along a single continuum. This contention would be consistent with findings on phenotypic variation (Kendler *et al.*, 2008; Neale *et al.*, 1994) showing that the "heritabilities of phobias are no different from those of milder fears" (Taylor, 1998, p. 210). Future studies would benefit from the addition of clinical samples, behavioral tests, physiologic measures, and other methods, to improve our understanding of differences between fears. This knowledge may help to tailor specific treatment strategies to specific types of fears and to determine, for



instance, whether subclinical fears may profit from the same therapeutic interventions that have been found to be effective for clinical phobias.

## References

- Agras, S., Sylvester, D., & Oliveau, D. (1969). The epidemiology of common fears and phobia. *Comprehensive Psychiatry*, *10*, 151-156.
- Anthony, M. M., Brown, T. A., & Barlow, D. H. (1997). Heterogeneity among specific phobia types in DSM-IV. *Behaviour Research and Therapy*, *35*, 1089-1100.
- Arrindell, W. A., Eisemann, M., Richter, J., Oei, T. P., Caballo, V. E., van der Ende, J., et al. (2003). Phobic anxiety in 11 nations. Part I: Dimensional constancy of the five-factor model. *Behaviour Research and Therapy*, *41*, 461-479.
- Arrindell, W. A., Pickersgill, M. J., Merckelbach, H., Ardon, A., & Cornet, F. C. (1991). Phobic dimensions: III. Factor analytic approaches to the study of common phobic fears; an updated review of findings obtained with adult subjects. *Advances in Behaviour Research and Therapy*, *13*, 73-130.
- Bles, W., Kapteyn, T. S., Brandt, T., & Arnold, F. (1980). The Mechanism of Physiological Height Vertigo: II. Posturography. *Acta Oto-Laryngologica*, *89*, 534-540.
- Boffino, C. C., de Sá, C. S., Gorenstein, C., Brown, R. G., Basile, L. F., & Ramos, R. T. (2009). Fear of heights: cognitive performance and postural control. *European Archives of Psychiatry and Clinical Neuroscience*, *259*, 114-119.
- CBS, Dutch Central Bureau of Statistics (2006). Population statistics 2005 (in Dutch). Retrieved august 2006, 2006, from: <http://statline.cbs.nl/StatWeb>.
- Costello, A. B., & Osborne, J. W. (2005). Best Practices in Exploratory Factor Analysis: Four Recommendations for Getting the Most From Your Analysis. *Practical Assessment, Research & Evaluation*, *10*, 1-9.

- Cox, B. J., McWilliams, L. A., Clara, I. P., & Stein, M. B. (2003). The structure of feared situations in a nationally representative sample. *Journal of Anxiety Disorders, 17*, 89-101.
- Curtis, G. C., Magee, W. J., Eaton, W. W., Wittchen, H. U., & Kessler, R. C. (1998). Specific fears and phobias. Epidemiology and classification. *The British Journal of Psychiatry 173*, 212-217.
- Depla, M. F., Ten Have, M. L., van Balkom, A. J., & de Graaf, R. (2008). Specific fears and phobias in the general population: Results from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Social Psychiatry and Psychiatric Epidemiology, 43*, 200-208.
- Field, A. P. (Ed.). (2005). *Discovering Statistics Using SPSS (2nd ed.)*. London: Sage publications.
- Fredrikson, M., Annas, P., Fischer, H., & Wik, G. (1996). Gender and age differences in the prevalence of specific fears and phobias. *Behaviour Research and Therapy, 34*, 33-39.
- Fyer, A. J. (1998). Current approaches to etiology and pathophysiology of specific phobia. *Biological Psychiatry, 44*, 1295.
- Hendrickson, A. E., & White, P. O. (1964). PROMAX: A quick method for rotation to oblique simple structure. *British Journal of Statistical Psychology, 17*, 65-70.
- Howard, W. A., Murphy, S. M., & Clarke, J. C. (1983). The nature and treatment of fear of flying: A controlled investigation. *Behavior Therapy, 14*, 557-567.
- Kendler, K. S., Gardner, C. O., Annas, P., Neale, M. C., Eaves, L. J., & Lichtenstein, P. (2008). A Longitudinal Twin Study of Fears From Middle Childhood to Early Adulthood: Evidence for a Developmentally Dynamic Genome. *Archives of General Psychiatry, 65*, 421-429.

- Kessler, R. C., & Merikangas, K. R. (2004). The National Comorbidity Survey Replication (NCS-R): background and aims. *International Journal of Methods in Psychiatric Research* 13, 60-68.
- LeBeau, R.T., Glenn, D., Liao, B., Wittchen, H-U., Beesdo-Baum, K. Ollendick, T. & Craske, M.G. (2010). Specific Phobia: A review of DSM-IV specific phobia and preliminary recommendations for DSM-V. *Depression and Anxiety*, 27, 1–20.
- Lipsitz, J. D., Barlow, D. H., Mannuzza, S., Hofmann, S. G., & Fyer, A. J. (2002). Clinical features of four DSM-IV-specific phobia subtypes. *Journal of Nervous and Mental Disease*, 190, 471-478.
- Loehlin, J. (1998). Latent variables models. London: Lawrence Erlbaum.
- Marks, I. & Mathews, A. (1979). Brief standard self-rating for phobic patients. *Behaviour Research and Therapy*, 17, 59-68.
- McDonald, S. D., Hartman, N. S., & Vrana, S. R. (2008). Trait anxiety, disgust sensitivity, and the hierarchic structure of fears. *Journal of Anxiety Disorders*, 22, 1059-1074.
- Mellon, R. (2000). A Greek-Language Inventory of Fears: Psychometric Properties and Factor Structure of Self-Reports of Fears on the Hellenic Fear Survey Schedule. *Journal of Psychopathology and Behavioral assessment* 22, 123-140.
- Muris, P., Merckelbach, H., Mayer, B., & Prins, E. (2000). How serious are common childhood fears? *Behaviour Research and Therapy*, 38, 217-228.
- Muris, P., Schmidt, H., & Merckelbach, H. (1999). The structure of specific phobia symptoms among children and adolescents. *Behaviour Research and Therapy*, 37, 863-868.
- Neale, M. C., Walters, E. E., Eaves, L. J., Kessler, R. C., Heath, A. C., & Kendler, K. S. (1994). Genetics of blood-injury fears and phobias: a population-based twin study. *American Journal of Medical Genetics*, 54, 326-334.

- Oosterink-Wubbe, F. M. D., De Jongh, A. & Aartman I. H. A. (2008). What are people afraid of during dental treatment? Anxiety provoking capacities of 67 stimuli comprising the dental setting. *European Journal of Oral Sciences*, 116, 44–51.
- Schermelleh-Engel, K., Moosbrugger, H., & Muller, H. (2003). Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-Fit Measures. *Methods of Psychological Research*, 8, 23-74.
- Staley, A. A., & O'Donnell, J. P. (1984). A developmental analysis of mothers' reports of normal children's fears. *Journal of Genetic Psychology*, 144, 165-178.
- Taylor, S. (1998). The hierarchic structure of fears. *Behaviour Research and Therapy*, 36, 205-214.
- Thurstone, L. L. (1947). Multiple factor analysis. Chicago, IL: The University of Chicago Press.
- van Gerwen, L. J., Spinhoven, P., Diekstra, R. W., & Van Dijck, R. (1997). People who seek help for fear of flying: typology of flying phobics. *Behavior Therapy*, 28, 237-251.
- Wolpe, J., & Lang, P. J. (1977). Manual for the Fear Survey Schedule (revised). San Diego, CA: Educational and Industrial Testing Service.

**Table 1. Models and clusters of fears as proposed by DSM-IV-TR as obtained in different studies**

Source and sample characteristics	Cluster I	Cluster II	Cluster III	Cluster IV
Model I (Current study)	Blood-injection-injury Injections, dentists, injuries, blood	Situational - Animal Enclosed spaces, darkness, lightening, snakes, spiders	Heights Heights, flying	
Model II (DSM-IV-TR)	Blood-injection-injury Injections, dentists, injuries, blood	Situational Enclosed spaces, flying	Natural- environment Lightening, darkness, heights	Animal Snakes, spiders
Model III (Fredrikson et al. 1996)	Blood-injection-injury Injections, dentists, injuries.	Situational Enclosed spaces, flying, lightening, heights, darkness		Animal Snakes, spiders

**Table 2. Four factor solution resulting from the EFA on the severity rating of fears as determined by Promax rotation**

	1	2	3	4
Items				
Blood	0.75			
Physical injuries	0.56			
Injections	0.56			
Spiders		0.81		
Darkness		0.54		
Thunder		0.42		
Enclosed spaces		0.39		
Flying			0.78	
Heights			0.67	
Dental treatment				0.74
Snakes				-0.42

**Table 3. Factor structure of severity of fears determined by Promax rotation**

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<b>Items</b>	<b>Situational-animal</b>	<b>blood-injection- injury</b>	<b>Height related</b>
Spiders	0.66		
Darkness	0.59		
Snakes	0.55		
Enclosed spaces	0.47		
Thunder	0.48		
Injections		0.75	
Blood		0.68	
Dental treatment		0.52	
Physical injuries		0.33	
Flying			0.74
Heights			0.61

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**Table 4. Fit indices of the three models on specific phobias**

Model	$\chi^2/df$	RMSEA	CI RMSEA*	CFI	AGFI	SRMR
Model I (Current study)	85.93/ 41	0.038	0.03-0.05	0.92	0.97	0.04
Model II (DSM-IV-TR)	81.37 / 38	0.037	0.03-0.05	0.92	0.97	0.04
Model III (Fredrikson et al. 1996)	91.02 / 41	0.039	0.03-0.05	0.91	0.97	0.04

\*90% confidence interval RMSEA



**Table 5. Fit indices for comparing the two non-nested Models I and III**

Model	AIC	CAIC	ECVI	CI ECVI
Model I (Current study)	138.2	280.4	0.17	0.14-0.21
Model II (DSM-IV-TR)	136.1	295.4	0.17	0.14-0.21
Model III (Fredrikson et al. 1996)	141.4	283.6	0.18	0.15-0.22

\*90% confidence interval ECVI