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Name	Kessler Helen
Kunden Adresse	
	Wiesendamm 6a
Benutzer_Nr.	2003058856
E-Mail-Adresse	helen.kessler@stud.unibas.ch
Bestelldatum	2008-08-11 11:46:01
Lieferprotokoll	EMAIL

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Benutzer_Nr.	
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Guttman scaling in agoraphobia: Cross-cultural replication and prediction of treatment response patterns

Jürgen Margraf* and **Anke Ehlers**

Department of Psychology, Philipps-University, Gutenbergstr. 18, D-3550 Marburg, West Germany

C. Barr Taylor, Bruce Arnow and **Walton T. Roth†**

Department of Psychiatry and Behavioral Sciences, Stanford University Medical School

The Fear and Avoidance Scales (FAS) is an 11-item questionnaire consisting of two subscales that measure features of agoraphobia and claustrophobia and that were demonstrated to be valid Guttman scales in a British clinical population. The purposes of the study reported here were to replicate the scale characteristics in the United States and to determine if improvement during treatment would follow the sequence predicted by the hierarchy implied in the scales. The FAS was given to 25 female agoraphobics before and after behavioural treatment. A principal components analysis replicated the agoraphobia and claustrophobia factors established in the British sample. Scalogram analyses showed that the Claustrophobia subscale of the FAS was a valid Guttman scale in the US sample whereas the Agoraphobia subscale yielded a high coefficient of reproducibility but a low coefficient of scalability. Treatment reduced the patients' fears and avoidances in the predicted sequence since for both scales the hierarchy of items remained unchanged following treatment.

Despite intensive research on agoraphobia, it is still not clear whether the multiple fears and avoidances characteristic of the condition are pure chance aggregations or whether they represent an ordered structure common to all agoraphobics (Marks, 1987; Mathews, Gelder & Johnston, 1981; Thorpe & Burns, 1983). Most measurement tools have been developed on the assumption that agoraphobics are likely to have some avoidance/fear behaviour and that ratings of disability can be given equal weight regardless of the particular type of behaviour they reflect. These problematic assumptions are not made by so-called behavioural hierarchies. Instead, the fears and avoidances of the patients are regarded as representing different levels of difficulty on one underlying dimension of fear/avoidance. In clinical practice the construction of these hierarchies has always been individual-specific. It is possible, however, that there are shared hierarchies common to all agoraphobics. One approach to testing this hypothesis, the use of Guttman scalogram analysis (Guttman, 1950), was first applied to the measurement of agoraphobia by Johnston,

* Requests for reprints.
† Also at Palo Alto Veterans Administration Medical Center.

Johnston, Wilkes, Burns & Thorpe (1984) in the UK. A principal components analysis of fear and avoidance ratings of 559 agoraphobics yielded an agoraphobic and a claustrophobic factor. Items representing these factors were used to construct two valid Guttman scales, the Fear and Avoidance Scales (FAS). A first purpose of the present study was to replicate the scale characteristics of the FAS in the different cultural context of the United States, thus testing their universality and eliminating possible sampling bias. A second purpose was to empirically test an important implication of a Guttman scale, namely, that improvement during treatment should follow the sequence predicted by the hierarchy implied in the scales.

Method

Subjects were 25 female agoraphobics participating in a treatment study (Arnow, Taylor, Agras & Telch (1985). Mean age was 39 (range 22–63). In contrast to Johnston *et al.* (1984) our sample was composed of patients seeking treatment who were diagnosed to the most stringent criteria. In addition to fulfilling the DSM-III criteria for agoraphobia with panic attacks, all subjects had to fail to complete a Behavioural Approach Test conducted in a large shopping centre and to score 20 or above on the Agoraphobia subscale of the Fear Questionnaire (Marks & Mathews, 1979).

The FAS consists of a six-item subscale for Agoraphobia and a five-item subscale for Claustrophobia (see Fig. 1 for a list of items). The version used in this study contained only those items found to represent valid Guttman scales by Johnston *et al.* (1984). Agoraphobia scale items are (in order of ascending difficulty in Johnston *et al.*'s study): 'answering the door bell' (BELL), 'talking to the neighbour in the street' (TALK), 'going to visit a friend's home' (VISIT), 'going to a local shop' (LOCSHOP), 'walking round nearest large shopping centre' (LARGSHOP), 'walking away from home by yourself for 15 minutes' (WALK15). Claustrophobia scale items are: 'travelling in a car' (CAR), 'sitting in a hall' (HALL), 'going into tunnels' (TUNNEL), 'travelling by train' (TRAIN), 'travelling by bus by yourself for 15 minutes' (BUS15). Subjects are asked to rate each item in terms of fear and/or avoidance on a three-point scale where 0 = 'virtually no fear/avoidance', 1 = 'some fear/sometimes avoid' and 2 = 'extreme fear/always avoid'. This is a short form of the five-point scale originally used by Johnston *et al.* (1984). The FAS was given before and after behavioural treatment consisting of four weeks of intensive exposure *in vivo* and eight weeks of either communication or relaxation training for couples (see Arnow *et al.*, 1985, for details).

To determine whether the FAS subscales could be replicated, two types of analyses were computed. First, we performed a principal components analysis (using varimax rotation) of the responses before therapy. Second, we investigated whether the data gathered before therapy formed valid cumulative scales using Guttman scalogram analysis while imposing the order of items found by Johnston *et al.* (1984) for the two subscales. Two standard statistics of Guttman scales were computed for each scale: the coefficient of reproducibility (CR) and the coefficient of scalability (CS). For further discussion of the rationale and procedure of Guttman scaling in agoraphobia the reader is referred to Johnston *et al.* (1984). To determine the effects of treatment the same analyses were performed on the FAS scores after the treatment phase. Following the approach of Johnston *et al.* (1984), the FAS responses were transformed into binary form using two different cut-offs contrasting either 0 scores with scores of 1 and 2, or 2 scores with scores of 0 and 1. All scalogram analyses were performed using the Guttman scalogram program of the SPSS library (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975). All other analyses were performed using the BMDP package (Dixon, Brown, Engelman, Frane, Hill, Jennrich & Toporek, 1985).

Results

The principal components analysis replicated the two-factor solution found by Johnston *et al.* (1984). After orthogonal rotation using the varimax procedure, the claustrophobia factor accounted for 27 per cent of the total variance. The loadings

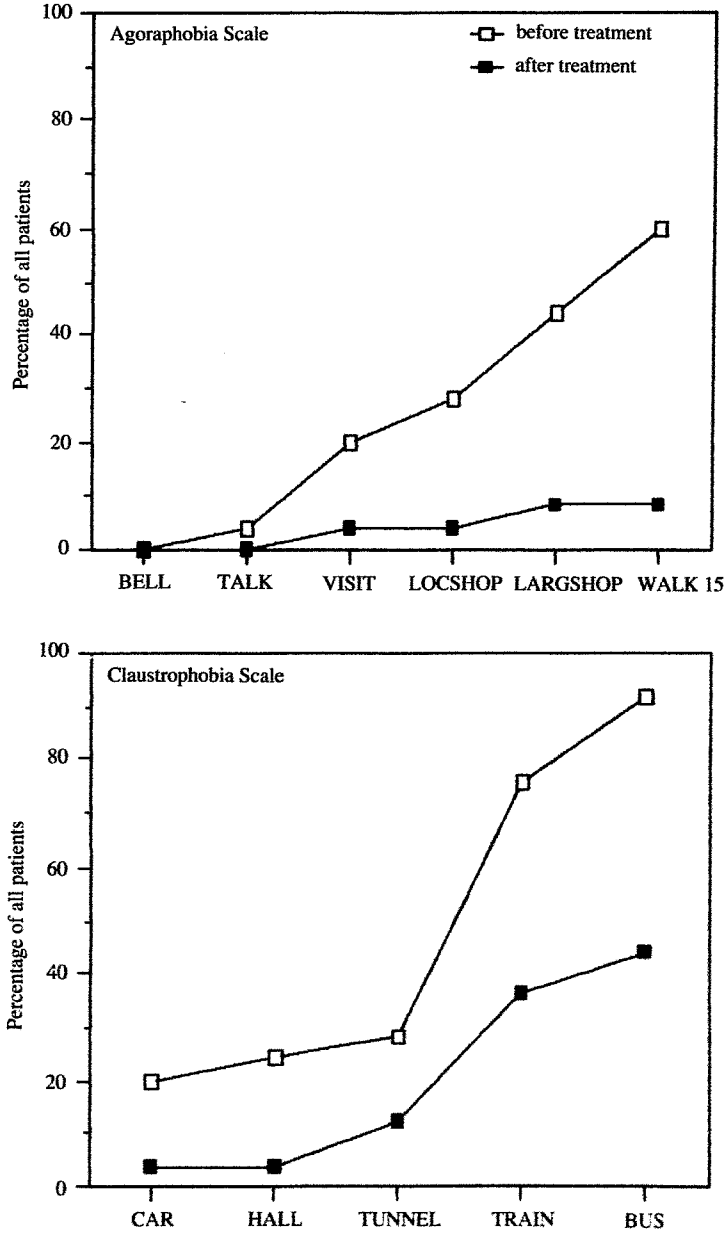

Figure 1. Proportion of subjects showing a fear/avoidance score of 2 ('extreme fear/always avoid') for each FAS item before and after behavioural treatment. Agoraphobia scale items are: 'answering the door bell' (BELL), 'talking to the neighbour in the street' (TALK), 'going to visit a friend's home' (VISIT), 'going to a local shop' (LOCSHOP), 'walking round nearest large shopping centre' (LARGSHOP), 'walking away from home by yourself for 15 minutes' (WALK15). Claustrophobia scale items are: 'travelling in a car' (CAR), 'sitting in a hall' (HALL), 'going in tunnels' (TUNNEL), 'travelling by train' (TRAIN), 'travelling by bus by yourself for 15 minutes' (BUS15). Items are presented in the order of ascending difficulty. The order of items was identical in the British and US samples.

of the five items of the Claustrophobia subscale on this factor varied from .46 (TRAIN) to .84 (CAR). The rotated agoraphobia factor accounted for 24 per cent of the total variance. Loadings of the items of the Agoraphobia subscale on this factor were generally satisfactory [from .56 (BELL) to .75 (LARGSHOP)] although two items did not show substantial loadings (VISIT: .10, WALK: .03).

Guttman scalogram analysis showed that the Claustrophobia subscale of the FAS could be replicated in our American out-patient sample using the pre-treatment scores. Imposing the order that Johnston *et al.* (1984) had found, the five claustrophobia items formed a cumulative scale with a CR of .92 and a CS of .60. These values are similar to those obtained by Johnston *et al.* (1984) for the original British sample (CR: .91–.93, CS: .65–.70 for the different cohorts). Similarly, the six agoraphobia items in the hierarchy of the British sample showed a cumulative pattern with a CR of .91 (Johnston *et al.*: .93). However, the CS did not reach the conventional lower limit of .60 (Torgerson, 1958), remaining at .52. The above analyses were based on a cut-off between scores of 1 and 2 (referred to as 'Avoidance Scales' by Johnston *et al.*). Similar to the British findings, this yielded better results than using the cut-off between scores of 0 and 1 (referred to as 'Fear Scales' by Johnston *et al.*). In our sample, none of the Fear Scales achieved satisfactory values for the CR and CS statistics. All further results are therefore based on the 'Avoidance Scales' (i.e. contrasting scores of 0 and 1 with scores of 2). The actual percentages of subjects 'failing' each item, i.e. obtaining a score of 2, are shown in Fig. 1.

The treatment reduced the patients' fears and avoidances very substantially (Arnow *et al.*, 1985). As can be seen in Fig. 1 this improvement followed the pattern predicted by the FAS since therapy did not alter the hierarchical structure of the items in either scale. After treatment the CR and CS for the Claustrophobia scale were even higher than before treatment (CR: .97, CS: .83). For the Agoraphobia scale the CR also rose, to .96, after treatment. The CS, however, dropped to the unacceptably low value of .2.

Discussion

Despite many differences between the United States and Great Britain, the FAS subscales developed on a British sample could be replicated in our US sample. The principal component analysis replicated Johnston *et al.*'s (1984) two-factor solution. Moreover, the scales showed similar cumulative patterns in the US sample and were overall valid Guttman scales with the exception of low CS values for the Agoraphobia subscale. The high CR values indicate that it is indeed possible for both scales to predict responses to individual items based on the total score of a FAS subscale. The low CS for the Agoraphobia scale means that the degree of predictability does not go much beyond that achieved by simply knowing the marginal probabilities of the responses to the items (the overall probability of 'passing' or 'failing' each item). In contrast, the Claustrophobia scale showed good scalability. In evaluating the CR and CS values obtained in this study, consideration must be given to the fact that the sample was limited to severe agoraphobics. Such a homogeneous sample with a small variance tends to yield diminished reproducibility scores as long as the variance is not zero. Further limitations arise from the

propensity of Guttman scales to capitalize on chance, the difficulties caused by the high frequency with which the more popular response was endorsed on many of the items (as shown in Fig. 1) and the small number of subjects (especially with respect to computing a principal component analysis).

It is especially interesting to note that improvement due to behavioural treatment did not alter the hierarchies of the scales. Thus, the FAS could be used to predict accurately the pattern of changes caused by therapy. These data provide evidence for a shared structure of avoidance behaviour between agoraphobics. As Johnston *et al.* (1984) suggested, there is an ordered hierarchy of disability and it is unlikely that an individual will avoid a highly difficult item unless he/she also avoids less difficult items. While the authors have chosen to label their scales the Agoraphobia and Claustrophobia scales, the latter does not reflect items clinically classified as claustrophobia. As four of the items refer to travelling a more appropriate term might be 'travelling scale'. Our results and those of Johnston *et al.* (1984) suggest that the FAS adds a useful dimension to the assessment of agoraphobia and our knowledge of its descriptive psychopathology. The scales should be considered as outcome measures in clinical trials and may aid the clinician in determining the severity of patients' problems and in targeting interventions.

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