

An empirical approach to subtype identification in individuals with social phobia

W. ENG, R. G. HEIMBERG,¹ M. E. COLES, F. R. SCHNEIER AND M. R. LIEBOWITZ

From the Adult Anxiety Clinic, Temple University, Philadelphia, PA and the Anxiety Disorders Clinic, New York State Psychiatric Institute, New York, NY, USA

ABSTRACT

Background. The present study used cluster analysis procedures to identify empirically subgroups of patients with social phobia in a large clinical sample.

Method. The Liebowitz Social Anxiety Scale (LSAS) was administered to 382 patients from several studies of the treatment of social phobia. LSAS fear ratings were summed into four subscale scores (social interaction, public speaking, observation by others, eating and drinking in public) based on a previous factor analytical study of the LSAS. In order to produce a stable and robust solution, these factor scores were submitted to a two-stage clustering procedure consisting of an agglomerative-hierarchical clustering method followed by an iterative non-hierarchical clustering method.

Results. Three patient subgroups were identified based on their pattern of feared social situations on the LSAS. These groups were labelled: (1) pervasive social anxiety; (2) moderate social interaction anxiety; and (3) dominant public speaking anxiety. Clusters differed significantly on age and age of social phobia onset, as well as on measures of social anxiety, general anxiety and depressive symptomatology. Clusters also differed in the percentage of assigned patients who met criteria for the generalized subtype of social phobia and avoidant personality disorder.

Conclusions. The results provide empirical support for the existence of three subgroups in a clinical sample of individuals with social phobia and contribute to the growing evidence for the heterogeneity of social phobia. Further study of the conceptual, clinical and aetiological significance of these subgroups is needed.

INTRODUCTION

Social phobia is an anxiety disorder characterized by an intense fear of embarrassment or humiliation in social and performance situations (American Psychiatric Association (APA), 1994). The accumulation of knowledge about social phobia since it first appeared in the *Diagnostic and Statistical Manual of Mental Disorders, 3rd edn* (DSM-III; APA, 1980) suggests that individuals who receive this diagnosis are a heterogeneous group (Heimberg *et*

al. 1993). Beginning with the DSM-III-R (APA, 1987) and continuing in DSM-IV (APA, 1994), individuals whose fears are manifest in most social situations are assigned to the generalized subtype of social phobia (GSP), while individuals whose fears are more circumscribed are grouped together as a separate category, currently referred to as non-generalized social phobia (NSP). Comparisons of individuals with GSP to those with NSP have consistently revealed differences between these two groups, and patients with GSP have been found to experience more severe social anxiety, greater depression, more significant impairment, and reduced life satisfaction (Heimberg *et al.* 1990; Herbert *et al.* 1992; Holt *et al.* 1992a; Turner *et al.* 1992; Levin *et al.*

¹ Address for correspondence: Dr Richard G. Heimberg, Adult Anxiety Clinic of Temple, Department of Psychology, Weiss Hall, Temple University, 1701 North 13th Street, Philadelphia, PA, 19122-6085, USA.

1993; Brown *et al.* 1995; Mannuzza *et al.* 1995; also see review by Heimberg *et al.* 1993). However, interpretation of these findings is limited because there has not been consensus regarding what constitutes most situations in the definition of GSP. In fact, it has been argued that the distinctions made between GSP and NSP are often arbitrary (e.g. Widiger, 1992; Heimberg *et al.* 1993).

Previous definitions used to classify patients with social phobia into the generalized subtype range from the broad fear of 'most or all social situations' (Holt *et al.* 1992a, p. 321) to the more limited fear of 'parties (social gatherings), initiating conversations, or maintaining conversations' (Turner *et al.* 1992, p. 327). Other definitions of GSP have required a 'fear of strangers or meeting people' (Horwath *et al.* 1998, p. 287), a fear of at least 'four commonly occurring social situations' (Hofmann *et al.* 1995, p. 225), or 'a marked impairment in most performance and socialization settings' (Levin *et al.* 1993, p. 209). While intra-site reliability may be adequate (reliability figures are rarely reported), varying subtype definitions across sites may have led to the classification of different patients as having GSP across sites.

In proposing subtyping options for the DSM-IV, Heimberg & Holt (1989) suggested that there may be three, rather than two, subtypes of social phobia. A generalized subtype would be assigned to persons whose anxiety was evident in most social situations, a circumscribed subtype would be assigned to persons whose anxiety was evident in a limited number of discrete situations, and a non-generalized subtype would be assigned to persons who experienced anxiety in social interaction situations but demonstrated anxiety in less than most social situations. The non-generalized group described individuals whose fears extend to many, but not most, domains of social functioning, hence bridging the apparent gap between fearing a limited number of social situations and 'most' social situations.

The DSM-IV subworkgroup on social phobia (Task Force in DSM-IV, APA, 1991) also considered a tripartite subtyping scheme. Their scheme included a Performance Type for fears limited to publicly performed activities, a Limited Interactional Type for fears limited to one or two situations involving social interaction,

and a Generalized Type for fears across most social situations. This subtyping system is unique in that it combines the traditional quantitative method of assessing patients (i.e. the number of feared situations) with an additional focus on the qualitative nature of feared situations (i.e. performance v. social interactional situations). However, a reanalysis of data from samples of treatment-seeking social phobics across three clinical sites produced insufficient data to support the adoption of this three-subtype model or of the Heimberg-Holt proposal. This conclusion was based upon a low frequency of subjects with the performance subtype (only 6% of total sample), low diagnostic reliability within sites, and a lack of meaningful differences between the performance and limited interactional subtypes (Schneier *et al.* 1998a).

One additional concern is that the situations feared by persons with social phobia are heterogeneous. In a recent attempt to identify categories of social fears empirically, Safren *et al.* (1999) performed an exploratory common factor analysis of the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). The LSAS is a clinician-administered scale that assesses a wide range of social interaction and performance situations that social phobia patients may fear and/or avoid. Four factors were identified: social interaction, public speaking, observation by others, and eating and drinking in public. In line with clinical observations of the heterogeneity of performance fears, the performance/observation realm was represented by three factors, whereas the social interaction items were best characterized by a single factor.

While factor analysis is a useful technique for detecting common underlying dimensions on which variables (e.g. feared situations) may be located, it cannot indicate group membership on the basis of these variables (e.g. situations). Kessler *et al.* (1998) used latent class analysis to determine empirically the number of subtype groups that underlie observed covariances among six different lifetime social fears (public speaking, using public restrooms, eating or drinking in public, talking with others, writing while being observed and talking in front of a small group) among respondents to the National Comorbidity Survey (NCS). The NCS utilized DSM-III-R criteria to estimate the lifetime prevalence of disorders in a sample of over 8000

non-institutionalized individuals throughout the United States. Respondents were best divided into two social phobia latent classes: one with pure speaking fears (35.8%) and one with at least one social interactional fear, with or without a speaking fear (64.2%). The latter group was characterized by a more chronic course, more frequent co-morbid diagnoses and greater impairment than the former group. Consistent with clinical observations of persons with GSP, respondents with three or more social fears reported the greatest impairment (also see Heimberg *et al.* 2000).

In the present investigation, cluster analysis was performed on items of the LSAS to determine whether distinct social phobia patient groups could be identified on the basis of their pattern of feared situations. Cluster analysis describes a group of statistical procedures that can be used to sort cases into relatively homogeneous subgroups based on their degree of similarity to one another on a set of variables. Unlike latent class analysis, cluster analysis does not test specific *a posteriori* assumptions about the distribution of latent variables (Lazarsfeld & Henry, 1968). While cluster analysis has not been previously applied to the examination of subtypes of social phobia, this methodology has been used increasingly in other areas of psychopathology research, such as personality disorders (e.g. Clark *et al.* 1997), obsessive-compulsive disorder (e.g. Calamari *et al.* 1999) and child behaviour disorders (e.g. Edelbrock & Achenbach, 1980).

Following cluster resolution, we examined the groups to determine whether they demonstrated clinically meaningful patterns of situational anxiety as determined by differences in pre-treatment characteristics (e.g. demographic characteristics, degree of impairment, symptom severity and co-morbidity with other disorders).

METHOD

Participants and procedure

The sample consisted of 382 patients who participated in several studies of the treatment of social phobia. One hundred and thirty patients participated in a study comparing the relative efficacy of cognitive-behavioural group therapy, educational supportive group therapy, phenelzine, and pill placebo (Heimberg *et al.* 1998),

and 86 participated in other studies of the efficacy of cognitive-behavioural group treatment of social phobia (Brown *et al.* 1995; Leung & Heimberg, 1996; Safren *et al.* 1997). Ninety-one patients participated in a study comparing phenelzine, atenolol, and pill placebo (Liebowitz *et al.* 1992) and 75 in a study comparing moclobemide and pill placebo (Schneier *et al.* 1998b).

All participants met DSM-III-R or DSM-IV criteria for a principal diagnosis of social phobia. Across studies, diagnoses were determined either by the Structured Clinical Interview for DSM-III-R (SCID) (Spitzer *et al.* 1992), the Anxiety Disorders Interview Schedule-Revised (ADIS-R; DiNardo & Barlow, 1988), the Anxiety Disorders Interview Schedule for DSM-IV: Lifetime Version (ADIS-IV-L; Brown *et al.* 1994), or the Schedule for Affective Disorders and Schizophrenia, lifetime version (modified for the study of anxiety disorders) (SADS-LA; Mannuzza *et al.* 1986). Patients were classified as having GSP if they demonstrated fear in most social situations or were otherwise classified as having NSP. Of the 356 patients for whom subtype data were available, 260 (73%) patients met criteria for GSP.

The sample consisted of 215 (56.3%) men, 165 (43.2%) women, and two persons for whom gender data were unavailable. Patients ranged in age from 18 to 61 years old (mean = 35.1, s.d. = 9.4). Further demographic characteristics for the sample can be found in Heimberg *et al.* (1999).

Measures and procedure

Clinician-administered measures

Prior to treatment, each participant was evaluated by an independent assessor who administered a variety of measures, including the LSAS. The LSAS contains 24 social interaction and performance situations rated on fear/anxiety, ranging from no fear/anxiety (0) to severe fear/anxiety (3), and avoidance, ranging from never avoids (0) to usually avoids (3). In a study utilizing the current data set, the LSAS was found to be highly internally consistent with good convergent and discriminant validity (Heimberg *et al.* 1999).

As mentioned above, Safren *et al.* (1999) performed an exploratory common factor analysis on fear scores on the LSAS. Safren *et al.* derived a four-factor solution using orthogonal

(varimax) rotation. The four factors were labelled: (1) social interaction; (2) public speaking; (3) observation by others; and, (4) eating and drinking in public. The cluster analysis reported herein was performed on LSAS factor scores rather than individual LSAS items. Factor scores were utilized because many of the items of the LSAS are highly inter-correlated and the use of raw data to compute a measure of similarity would bias the results. Factor analysis creates relatively independent dimensions and a conceptually meaningful taxonomy of the data (Aldenderfer & Blashfield, 1984; Hair *et al.* 1995). Factor scores were computed by summing the scores of all items that loaded significantly on each factor. Because of high correlations between each fear/anxiety rating and its corresponding avoidance rating ($rs > 0.88$; Heimberg *et al.* 1999), only the fear/anxiety ratings were utilized in this study.[†]

Patients in the studies by Heimberg *et al.* (1998) and Schneier *et al.* (1998b) were also administered the 14-item Hamilton Anxiety Scale (HAM-A; Hamilton, 1959) and the 21-item Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960) during the pre-treatment assessment. These instruments assess the cognitive, behavioural and somatic components of anxiety and depression, respectively.

For those patients who received either the ADIS-R or the ADIS-IV-L interview, a Clinician's Severity Rating (CSR) for social phobia was also available. The CSR is an index of the severity of social phobia symptoms and the degree of associated impairment, rated on a 0–8 scale. A rating of ≥ 4 indicates the presence of clinically severe social phobia.

For patients in the studies by Heimberg *et al.* (1998), Brown *et al.* (1995), Leung & Heimberg, (1996) and Safren *et al.* (1997), the independent assessor also administered the Avoidant Personality Disorder (APD) module of the Personality Disorders Examination (PDE; Loranget, 1988). The items, which are rated on a 0–2 scale, correspond to the DSM-III-R criteria for APD, with a score of 1 given when the patient probably meets the criterion and a score of 2 given when the patient definitely meets the criterion. Patients in the Schneier *et al.* (1998b) study were assessed for APD with the Structured

Clinical Interview for DSM-III-R Personality Disorders (SCID-II; Spitzer *et al.* 1990).

Self-report measures

As part of the specific study in which they took part, patients also completed a variety of self-report questionnaires assessing social phobia, depression, and related constructs. The Social Interaction Anxiety Scale (SIAS)² and the Social Phobia Scale (SPS) (Mattick & Clarke, 1998) are companion scales used to assess anxiety experienced during social interactional situations and while under the potential scrutiny of others, respectively. Both scales contain 20 self-statements rated on a 5-point scale assessing the degree to which patients believe the statement is characteristic of them.

The Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969) contains 30 true/false statements that are used to elicit the extent to which people fear the possibility of disapproval of others. The Social Phobia Subscale of the Fear Questionnaire (FQ-So; Marks & Matthews, 1979) is a 5-item instrument that assesses the degree of avoidance of feared social situations. All of these measures are widely used in the assessment of social phobia and have well-established validity and reliability. For a more detailed review of the psychometric properties of these measures, see Hart *et al.* (1999).

The Beck Depression Inventory (BDI; Beck *et al.* 1979) consists of 21 items measuring the cognitive, behavioural, and somatic symptoms associated with depression. The BDI has been shown to have strong psychometric properties among individuals with depression (Beck *et al.* 1988) and has recently been found to exhibit good internal consistency and retest reliability among individuals with social phobia (Coles *et al.* 1999).

Cluster analysis procedure

Because the factors of the LSAS contain different numbers of items, standardization within patients of each factor scale was performed in order to avoid giving preferential weight to those factors with more items in our cluster analysis (Hair *et al.* 1995). Each patient thus had four *z*-scores assigned to him/her, one for each factor, representing the relative degree of their own fear across classes of situations. Using the CLUSTER procedure in SPSS 9.0 (SPSS, Inc.,

[†] The notes will be found on p. 1355.

1998), the standardized summary scores were subjected to an agglomerative hierarchical cluster analysis utilizing Ward's (1963) minimum variance method with a squared Euclidean distance metric to represent the dissimilarity between each pair of cases. Ward's technique has been frequently used in the behavioural sciences and has demonstrated superior performance in recovering the known underlying structure of a data set (Borgen & Barnett, 1987). This technique identifies individual clusters by joining groups of patients together whose scores produce minimum increases in the within-cluster sum of squares (Everitt, 1980). For pragmatic purposes, only solutions with 2 to 6 clusters were considered.

To determine the number of clusters we examined the agglomeration schedule. Large changes in the agglomeration coefficients are indicative of two very different clusters being merged and therefore indicative of a stopping point (Hair *et al.* 1995). We then examined the suggested solution(s) to assess their utility. After determining the best number of clusters, the robustness of the different cluster solutions was assessed by using the specified means of each cluster (centroids) produced by Ward's method as initial estimates of cluster configurations in a subsequent non-hierarchical K-means cluster analysis (QUICK CLUSTER; SPSS, Inc., 1998). K-means cluster analysis employs an iterative procedure wherein patients are repeatedly assigned to cluster membership on the basis of their smallest Euclidean distance to each subsequent cluster centroid. The degree of agreement between the results of the Ward's and K-means method was used as an objective measure of the stability of the solution (Hartigan, 1975; Milligan, 1980).

RESULTS

Examination of the agglomeration coefficients suggested a two-cluster solution as best for our data. However, further analyses suggested that a three-cluster solution was the most robust and stable ($\kappa = 0.86$). In comparison, the degree of agreement between the Ward's and K-means solutions for the two-cluster solution was less satisfactory ($\kappa = 0.55$). Upon further analysis into the defining characteristics of the two- and

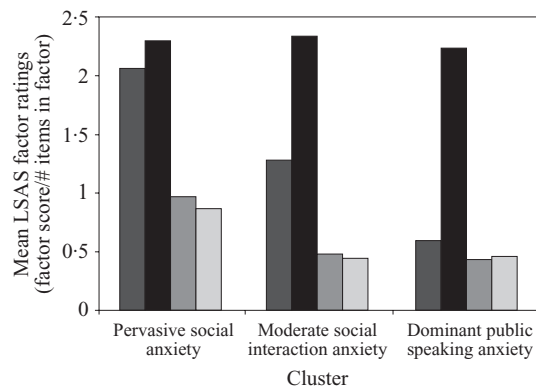


FIG. 1. Mean item Liebowitz Social Anxiety Scale factor scores for each of the three clusters. (■, social interaction; ■, public speaking; ■, observation; ■, eating and drinking in public.)

three-cluster solutions (reported below), it appears that the three-cluster solution provides more meaningful interpretations. Fig. 1 shows the situational anxiety profiles for each of the three clusters.³ The raw means and standard deviations for the individual items that comprise the LSAS factors for the three-cluster solution are presented in Table 1. In addition, the raw means and standard deviations along with the mean *z*-scores for each of the LSAS factor scores for the three-cluster solution are presented in Table 2.

Patterns of social anxiety within clusters

In order to assess whether the three clusters differed on each of the LSAS factors, we performed separate between-cluster univariate analyses of variance (ANOVA) on each of the LSAS factor scores. The overall ANOVAs suggested group differences for each factor except for the public speaking factor, for which all groups earned high scores. Each cluster was labelled in terms of the factor(s) that seemed to characterize best its pattern of social anxiety: (1) a 'pervasive social anxiety' group ($N = 213$); (2) a 'moderate social interaction (SI) anxiety' group ($N = 103$); and, (3) a 'dominant public speaking (PS) anxiety' group ($N = 66$). The 'pervasive social anxiety' group achieved significantly higher scores than the other two groups on the three factors not related to public speaking. The 'moderate SI anxiety' group had higher scores on social interaction fear relative

Table 1. *Comparison of clusters on items comprising the Safren et al. (1999) Liebowitz Social Anxiety Scale Factors*

Item number and wording	Cluster					
	Pervasive social anxiety		Moderate social interaction anxiety		Dominant public speaking anxiety	
	Mean	(S.D.)	Mean	(S.D.)	Mean	(S.D.)
Social interaction factor						
5 Talking to people in authority	2.09	(0.84)	1.63	(0.85)	1.05	(0.85)
7 Going to a party	2.23	(0.82)	1.64	(0.86)	0.92	(1.00)
10 Calling someone you do not know very well	1.77	(0.90)	0.93	(0.68)	0.36	(0.60)
11 Talking with people you do not know very well	2.03	(0.82)	1.17	(0.69)	0.36	(0.54)
12 Meeting strangers	2.07	(0.83)	1.18	(0.83)	0.32	(0.59)
18 Expressing a disagreement or disapproval to people you do not know very well	2.12	(0.86)	1.47	(0.81)	0.77	(0.86)
19 Looking at people you do not know very well in the eyes	1.84	(0.94)	0.84	(0.79)	0.77	(0.86)
21 Trying to pick someone up	2.47	(0.80)	1.68	(1.04)	0.79	(0.92)
Observation fear factor						
1 Telephoning in public	0.92	(1.00)	0.43	(0.68)	0.24	(0.56)
9 Writing while being observed	0.48	(0.75)	1.00	(1.08)	0.67	(1.00)
13 Urinating in a public bathroom	0.67	(0.95)	0.29	(0.52)	0.20	(0.66)
17 Taking a test	1.30	(1.05)	0.74	(0.89)	0.61	(0.93)
Public speaking factor						
2 Participating in small groups	1.88	(0.90)	1.71	(0.88)	1.55	(1.01)
6 Acting, performing, or giving a talk in front of an audience	2.54	(0.79)	2.84	(0.39)	2.83	(0.51)
15 Being the centre of attention	2.35	(0.86)	2.14	(0.88)	2.03	(1.10)
16 Speaking up at a meeting	2.30	(0.82)	2.40	(0.69)	2.23	(0.87)
20 Giving a report to a group	2.40	(0.86)	2.58	(0.69)	2.55	(0.77)
Eating and drinking in public factor						
3 Eating in public spaces	0.92	(1.08)	0.52	(0.75)	0.58	(0.98)
4 Drinking with others in public places	0.81	(1.04)	0.36	(0.67)	0.35	(0.75)

Table 2. *Means, standard deviations and mean z-scores of the Safren et al. (1999) Liebowitz Social Anxiety Scale Factors for each cluster group*

Cluster	Mean	(S.D.)	Z_{mean}
Pervasive social anxiety ($N = 213$)			
Social interaction	2.07	(0.56)	1.14
Public speaking	2.29	(0.68)	0.42
Observation	0.97	(0.66)	-0.60
Eating and drinking in public	0.87	(0.96)	-0.96
Moderate social interaction anxiety ($N = 103$)			
Social interaction	1.28	(0.35)	0.71
Public speaking	2.33	(0.51)	0.98
Observation	0.48	(0.43)	-0.74
Eating and drinking in public	0.44	(0.65)	-0.95
Dominant public speaking anxiety ($N = 66$)			
Social interaction	0.60	(0.33)	-0.01
Public speaking	2.24	(0.58)	1.33
Observation	0.43	(0.47)	-0.59
Eating and drinking in public	0.46	(0.77)	-0.74

Z_{mean} , mean Z-scores for each of the LSAS factors.

to the 'dominant PS anxiety' group, whose scores were elevated only on public speaking fear. The 'moderate SI anxiety' group and the

'dominant PS anxiety' group did not differ on either observation fears or fears about eating and drinking in public.

Table 3. Comparison of clusters on clinical characteristics

Dependent variable	%			χ^2		
	Pervasive social anxiety	Moderate SI anxiety	Dominant PS anxiety	Pervasive social anxiety v. Moderate SI anxiety	Pervasive social anxiety v. Dominant PS anxiety	Moderate SI anxiety v. Dominant PS anxiety
Generalized social phobia	86.7 ^a	70.1 ^b	35.9 ^c	11.63**	64.66***	18.32***
Avoidant personality disorder	55.9 ^a	33.8 ^b	16.7 ^b	11.33**	22.60***	4.41
Co-morbid mood disorder	31.4 ^a	21.6 ^{ab}	5.3 ^b	1.45	5.34*	2.59
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)			
Age of onset of SP	13.82 ^a (7.50)	18.80 ^b (10.37)	23.70 ^c (9.55)			

Means in the same row with different superscripts differ. In the case of χ^2 analyses, the means differ at $P < 0.017$ according to follow-up χ^2 analyses using a Bonferroni-adjusted alpha.

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

In the case of ANOVA, means in the same row with different superscripts differ according to follow-up Newman–Keuls tests.

Demographic characteristics

Demographic characteristics for the full sample are reported by Heimberg *et al.* (1999). Comparisons on categorical and continuous demographic variables were made using chi-square analyses and oneway ANOVAs, respectively. No differences were found among clusters for gender⁴ (χ^2 (2, $N = 380$) = 1.50, NS), education (χ^2 (4, $N = 212$) = 2.43, NS), marital status (χ^2 (2, $N = 210$) = 0.55, NS), living situation, (χ^2 (2, $N = 205$) = 0.29, NS), or employment (χ^2 (2, $N = 207$) = 0.88, NS). The ANOVA revealed significant differences in age (F (2, 379) = 4.00, $P = 0.02$). Newman–Keuls' comparisons showed that the 'pervasive social anxiety' group was younger (mean = 34.06, s.d. = 9.41) than the 'dominant PS anxiety' group (mean = 37.68, s.d. = 9.71), but not different from the 'moderate SI anxiety' group (mean = 35.64, s.d. = 8.95). The ages of the 'dominant PS anxiety' group and the 'moderate SI anxiety' group did not differ from each other.

Clinical characteristics

The three clusters were compared on clinical variables using either chi-square analyses or one-way ANOVAs and appropriate follow-up comparisons as warranted (see Table 3). There were significant differences among clusters on social phobia subtype (χ^2 (2, $N = 356$) = 63.54, $P < 0.001$), the likelihood of an APD diagnosis (probable/definite *versus* absent, (χ^2 (2, $N = 280$) = 26.75, $P < 0.001$) and age of onset of

social phobia (F (2, 138) = 10.95, $P < 0.001$). The clusters also differed marginally on the frequency of a co-morbid mood disorder diagnosis (i.e. bipolar disorder, major depressive disorder, dysthymic disorder, or depressive disorder not otherwise specified) (χ^2 (2, $N = 140$) = 5.89, $P = 0.053$).

Symptom measures

Two oneway multivariate analyses of variance (MANOVAs), with cluster membership as the independent variable, were conducted for pre-treatment scores on measures of social anxiety and depression, respectively. The overall MANOVAs for the social phobia indices (Wilks' $\lambda = 0.60$; F (10, 342) = 9.83; $P < 0.001$) and depression measures (Wilks' $\lambda = 0.89$; F (4, 482) = 7.56; $P < 0.001$) yielded significant effects for cluster. Bonferroni-adjusted oneway ANOVAs followed by Newman–Keuls' tests were used for *post hoc* comparisons between clusters (see Table 4). On four of the five social anxiety measures, the 'pervasive social anxiety' and the 'moderate SI anxiety' groups were more anxious than the 'dominant PS anxiety' group, but did not differ from each other. Both measures of depressive symptoms showed that all three clusters differed significantly with the ordering from highest to lowest scores as follows: 'pervasive social anxiety', then 'moderate SI anxiety', then 'dominant PS anxiety'.

Finally, a oneway ANOVA revealed that clusters differed on levels of general anxiety (HAM-A; F (2, 273) = 9.57, $P < 0.001$). New-

Table 4. Comparison of clusters on pretreatment levels of symptom severity

Symptom	Scale range	Cluster						<i>F</i>
		Pervasive social anxiety		Moderate social interaction anxiety		Dominant public speaking anxiety		
		Mean	(S.D.)	Mean	(S.D.)	Mean	(S.D.)	
Social anxiety (<i>N</i> = 178)								
CSR	0 to 8	6.02 ^a	(0.98)	5.72 ^a	(0.96)	5.07 ^b	(0.87)	10.38***
FNE	0 to 30	26.24 ^a	(4.38)	23.93 ^a	(6.62)	17.85 ^b	(8.21)	21.68***
FQ-So	0 to 40	21.51 ^a	(7.09)	20.46 ^a	(7.00)	14.56 ^b	(6.51)	10.53***
SIAS	0 to 80	53.90 ^a	(12.88)	43.68 ^b	(12.82)	27.11 ^c	(13.17)	47.33***
SPS	0 to 80	32.99 ^a	(16.12)	32.21 ^a	(15.95)	20.48 ^b	(13.34)	6.99**
Depression (<i>N</i> = 188)								
BDI	0 to 63	14.33 ^a	(8.57)	11.81 ^b	(8.00)	7.50 ^c	(5.90)	8.56***
HRSD	0 to 64	12.02 ^a	(6.80)	10.31 ^b	(5.26)	7.67 ^c	(5.21)	6.10**
General anxiety (<i>N</i> = 276)								
HAM-A	0 to 56	15.13 ^a	(6.32)	14.70 ^a	(5.89)	10.77 ^b	(5.73)	9.57***

Means in the same row with different superscripts differ at $P < 0.05$ according to Newman-Keuls *post hoc* comparisons.

CSR, Anxiety Disorders Interview Schedule Clinician Severity Rating; FNE, Fear of Negative Evaluation Scale; FQ-So, Social Phobia Subscale of the Fear Questionnaire; SIAS, Social Interaction Anxiety Scale; SPS, Social Phobia Scale; BDI, Beck Depression Inventory; HRSD, Hamilton Rating Scale for Depression; HAM-A, Hamilton Anxiety Scale.

** $P < 0.01$; *** $P < 0.001$.

man-Keuls *post hoc* comparisons showed that the 'moderate SI anxiety' and the 'pervasive social anxiety' groups both had greater levels of general anxiety than the 'dominant PS anxiety' group, but did not differ from each other.

DISCUSSION

In the present study, three statistically reliable groups of social phobia patients were identified from cluster analyses of scores on four factor-analytically derived subscales of the Liebowitz Social Anxiety Scale reported by Safren *et al.* (1999). These three empirically-derived subgroups have characteristics similar to those of subtypes of social phobia described in previous research, strengthening the external validity of these findings. Specifically, the 'pervasive social anxiety' group appears similar to the group of patients described by the DSM-IV definition of the generalized subtype of social phobia, whose anxiety is evident in most social situations. Patients in this cluster experienced elevated anxiety in both social interaction and public speaking situations, as well as significantly greater anxiety than reported by other clusters in both observation and eating/drinking in public situations. Indeed, this group was largely composed of patients who had been assigned the generalized subtype of SP at baseline. The

'pervasive social anxiety' cluster was also larger than the other two groups, consistent with the increased treatment seeking behaviour demonstrated by persons who are more likely to be severely impaired by their social fears (Wittchen *et al.* 1999).

The 'moderate SI anxiety' group appears similar to the non-generalized subtype of social phobia as described by Heimberg & Holt (1989; Heimberg *et al.* 1993), which characterized patients who experienced social interactional anxiety but who demonstrated one or more domains of social functioning that were not significantly impaired. Patients in this cluster experienced elevated anxiety only in social interaction and public speaking situations. However, this group was also largely composed of patients who had been diagnosed with GSP at baseline, although the percentage of generalized patients in this cluster was somewhat lower than in the pervasive social anxiety cluster. This apparent discrepancy may be accounted for by the broad range of situations encompassed by the LSAS social interaction factor. Specifically, it includes items as diverse as 'talking to people in authority', 'meeting strangers' and 'trying to pick someone up'. These items have been conceptualized in clinical practice and in previous research (e.g. Holt *et al.* 1992b) as representing the separate domains of assertive-

ness, informal social interaction and dating behaviour. Thus, persons who endorse all of these items, along with public speaking anxiety, may be classified by clinical assessors as having generalized social phobia.

Finally, the 'dominant PS anxiety' group appears analogous to Heimberg & Holt's (1989) circumscribed subtype and the DSM-IV Task Force's (1991) Performance Type. In this study, only patients with public speaking fear stood out as a homogeneous circumscribed subgroup, showing little or no fear in social interaction, observation by others, or eating and drinking in public. This cluster had the smallest group membership (17.3% of the total sample) and included the largest percentage of patients classified as having NSP. The smaller, but not insignificant, number of patients represented in this cluster is consistent with previous observations that persons with pure public speaking fears may have a relatively low prevalence in clinical samples due to a low rate of treatment seeking behaviour (Kessler *et al.* 1998) but that a portion of persons with public speaking fears may experience substantial impairment in functioning (Stein *et al.* 1996).

Several observations concerning the results of the cluster analyses merit further discussion. An examination of the mean ratings for each factor in the three-cluster solution shows that all three cluster groups reported quite extreme public speaking fears, but that these fears had no significant effect on cluster membership. This finding speaks to the ubiquity of public speaking fears among social phobics, a finding that has been replicated in several studies (e.g. Amies *et al.* 1983; Holt *et al.* 1992*b*). Thus, the public speaking factor may not be a very strong discriminator among subgroups. In contrast, scores on the social interaction factor were normally distributed within the total sample, leading to the differential patterning of social interaction fears across clusters. Though both the 'moderate SI anxiety' and the 'pervasive social anxiety' groups were significantly elevated on this factor, the variability among patients in their ratings of anxiety in social interaction situations allowed for reliable cluster discrimination. Thus, the 'dominant PS anxiety' group is not best distinguished by its severity of anxiety in any one area, but rather, its lack of anxiety across several.

Clusters differed on both age at intake and age of onset of social phobia. The 'pervasive social anxiety' group was younger, consistent with the finding that this group also reported the earliest age of phobia onset and with the findings that individuals with GSP have an earlier age of onset and are younger at presentation for treatment than individuals with NSP (Heimberg *et al.* 1990; Holt *et al.* 1992*a*; Levin *et al.* 1993; Mannuzza *et al.* 1995). However, while the 'pervasive social anxiety' group was youngest at onset and at intake, it is interesting to note that they waited for the longest interval between onset and treatment seeking, possibly suggesting that this group found the prospect of treatment to be highly anxiety-provoking.

An examination of between-cluster differences on social anxiety measures showed that patients in both the 'pervasive social anxiety' and the 'moderate SI anxiety' groups reported more distress and impairment, greater fear of negative evaluation, greater avoidance of feared situations and greater performance fears than the 'dominant PS anxiety' group. This pattern of group differences was similar for the measure of general anxiety and is congruent with previous research indicating that individuals with GSP have more pervasive and severe symptomatology than those with NSP (e.g. Heimberg *et al.* 1990; Holt *et al.* 1992*a*; Turner *et al.* 1992; Brown *et al.* 1995). This pattern of data also demonstrates that the 'pervasive social anxiety' and the 'moderate SI anxiety' groups seem to have much in common, although they did differ in severity of social interaction anxiety and depression. However, these groups did not reside in the same cluster in either the two- or three-cluster solutions. The 'pervasive social anxiety' group was consistently represented in both the two- and three-cluster solutions, but the other group in the two-cluster solution separated into the 'moderate SI anxiety' and 'dominant PS anxiety' groups in the three-cluster solution. The two-cluster solution may more closely resemble the current DSM-IV subtyping system. However, the three-cluster solution appears to be more comprehensive, including the 'dominant PS' patients who often get lost within a clinical population but may in fact be well represented in a community sample.

Somewhat contrary to initial expectations, the 'dominant PS anxiety' group reported lesser

performance fears (as assessed by the SPS) than the other cluster groups. However, in retrospect, this finding is consistent with laboratory challenges of simulated public speaking, in which patients with GSP have been shown to demonstrate lower heart rates but higher subjective and objective anxiety symptoms than 'discrete social phobics' (Levin *et al.* 1993). As well, an exploratory common factor analysis of the items from the SIAS and the SPS conducted by Safren *et al.* (1998) suggests that the performance fears assessed by the SPS are multifactorial, encompassing fears of being observed by others as well as fears that others will notice their anxiety symptoms. Thus, those with other social fears in addition to public speaking, such as patients in the 'pervasive social anxiety' and the 'moderate SI anxiety' groups, may actually endorse more items on the measure.

On the SIAS, the 'pervasive social anxiety' group reported greater social interaction fear than the 'moderate SI anxiety' group, which had, in turn, greater social interaction fear than the 'dominant PS anxiety' group. The same pattern of differences was also found for levels of depressive symptomatology, consistent with the frequently reported co-occurrence of anxiety and depression in clinical populations (Clark *et al.* 1989; Kendall & Watson, 1989). In accord with these findings, the 'pervasive social anxiety' group also had a greater frequency of mood disorders than the 'dominant PS anxiety' group.

Examination of APD diagnosis across clusters suggests that the patients in the 'pervasive social anxiety' group were most likely to receive an additional APD diagnosis. Other studies have also demonstrated a high degree of association between APD and GSP. Heimberg (1996) reported that individuals with GSP were more likely than individuals with NSP to meet criteria for APD also. Several researchers have suggested that APD may in fact represent a more symptomatically severe form of GSP rather than a distinct clinical entity (e.g. Widiger, 1992; Heimberg, 1996). In support of this hypothesis, individuals with both GSP and APD are more severely impaired on measures of depression, social anxiety and social avoidance, and have a larger number of additional diagnoses than social phobics without APD (Holt *et al.* 1992a; Brown *et al.* 1995; Johnson & Lydiard, 1995; Feske *et al.* 1996).

The present study produced three statistically reliable clusters, or subgroups, that have some meaningful differences on the available external indicators. However, it should be noted that cluster analysis is an empirical procedure that relies heavily upon the initial selection of variables as well as the final interpretation of the researcher. As such, the variables determine the character of the subsequent clusters. By deciding to use different types of social situations as the variate, we preclude the ability to interpret clusters based upon the number of feared situations or upon the severity of social phobia, which may also serve as legitimate bases for future research.

Several important variables that would have strengthened the clinical utility of the derived cluster groups were not available for analysis. Specifically, cluster membership may have implications for differential response to cognitive-behavioural or pharmacological treatments. Future studies might also examine the rates of social phobia among the relatives of patients in the derived clusters. Speculatively, there may be an increased morbidity for GSP, but not for NSP, among the relatives of probands in the 'pervasive social anxiety' group and the 'moderate SI anxiety' group. Finally, future research might aim to assess the psychophysiological correlates of the clusters. An examination of differential patterns of physiological arousal by cluster membership in the face of behavioural challenges would provide support for a qualitative difference between social phobia subtypes. In particular, despite the ubiquity of public speaking fears across the three groups, there may in fact be mechanistic differences between public speaking fears in the 'dominant PS anxiety' group *versus* the others, as challenge studies suggest.

In summary, previous attempts to determine subgroups of social phobic patients have relied on either clinical descriptions or *a priori* theoretical speculation. Research aimed at validating multiple subtype models has been limited by numbers of patients in certain subgroups. The present study utilized a large clinical database compiled from several studies and provides empirical support for three subtypes of social phobia. The clusters differed on several indices, including age of onset, age at clinical presentation, levels of social anxiety, levels of

depressive symptomatology and frequency of co-morbid mood disorder diagnoses. Several avenues of convergence between our empirically-driven approach and other research strengthen the conclusions of this study. However, the statistical differentiation of these three groups does not assure clinical utility over and above the current two-subtype model of social phobia. Future research efforts directed towards replication and validation of these empirically-derived subgroups is needed, especially in a large, non-clinical population, as it is likely that heterogeneity within this disorder will prove to be of conceptual, clinical and aetiological significance.

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NOTES

- ¹ LSAS items that loaded on more than one factor were not included as variables in the cluster analysis in order to maximize the homogeneity and interpretability of cluster solutions. These items were: working while being observed; giving a party; resisting a high-pressure salesperson; entering a room when others are already seated; and, returning goods to a store.
- ² Of the two versions of the SIAS that are available, this study used the 20-item version.
- ³ The graph of mean factor ratings for the non-hierarchical solution was visually similar to that of the hierarchical solution and is available from the authors.
- ⁴ All following analyses were two-tailed and utilized an alpha level of 0.05, unless otherwise indicated. Because some measures were not administered in some studies, sample sizes vary in these and the following analyses.
- ⁵ Data on co-morbid mood disorders were only available from patients who participated in Heimberg *et al.* (1998) and the related studies of

the efficacy of cognitive-behavioural group treatment of social phobia (Brown *et al.* 1995; Leung & Heimberg, 1996; Safren *et al.* 1997). All participants received a principal diagnosis of DSM-III-R or DSM-IV social phobia with or without co-morbid mood disorders using the ADIS-R or the ADIS-IV-L.

REFERENCES

- Aldenderfer, M. S. & Blashfield, R. K. (1984). *Cluster Analysis*. Sage Publications, Inc.: Newbury Park, CA.
- American Psychiatric Association (1980). *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edn. APA: Washington, DC.
- American Psychiatric Association (1987). *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edn Revised. APA: Washington, DC.
- American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders*, 4th edn. APA: Washington, DC.
- Amies, P. L., Gelder, M. G. & Shaw, P. M. (1983). Social phobia: a comparative clinical study. *British Journal of Psychiatry* **142**, 174–179.
- Beck, A. T., Rush, A. J., Shaw, B. F. & Emery, G. (1979). *Cognitive Therapy of Depression*. Guilford Press: New York.
- Beck, A. T., Steer, R. A. & Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clinical Psychology Review* **8**, 77–100.
- Borgen, F. H. & Barnett, D. C. (1987). Applying cluster analyses in counseling psychology research. *Journal of Counseling Psychology* **34**, 456–468.
- Brown, E. J., Heimberg, R. G. & Juster, H. R. (1995). Social phobia subtype and avoidant personality disorder: Effect on severity of social phobia, impairment, and outcome of cognitive-behavioral treatment. *Behavior Therapy* **26**, 467–486.
- Brown, T. A., DiNardo, P. A. & Barlow, D. H. (1994). *Anxiety Disorders Interview Schedule for DSM-IV: Lifetime Version (ADIS-IV-L)*. Graywind Publications: Albany, NY.
- Calamari, J. E., Wiegartz, P. S. & Janeck, A. S. (1999). Obsessive-compulsive disorder subgroups: a symptom-based clustering approach. *Behaviour Research and Therapy* **37**, 113–125.
- Clark, D. A., Beck, A. T. & Brown, G. (1989). Cognitive mediation in general psychiatric outpatients: a test of the content-specificity hypothesis. *Journal of Personality and Social Psychology* **56**, 958–964.
- Clark, D. A., Steer, R. A., Haslam, N., Beck, A. T. & Brown, G. K. (1997). Personality vulnerability, psychiatric diagnoses, and symptoms: cluster analyses of the sociotropy-autonomy subscales. *Cognitive Therapy and Research* **21**, 267–283.
- Cohen, J. (1977). *Statistical Power Analysis for the Behavioral Sciences: Revised Edition*. Academic Press: New York.
- Coles, M. E., Gibb, B. E. & Heimberg, R. G. (1999). The use of the Beck Depression Inventory as an assessment of depressive symptomatology in a clinically anxious population. Poster presented at the annual meeting of the Association for Advancement of Behavior Therapy, November 1999, Toronto, Ontario, CA.
- DiNardo, P. A. & Barlow, D. H. (1988). *Anxiety Disorders Interview Schedule, Revised (ADIS-R)*. Graywind Publications: Albany, NY.
- Edelbrock, C. & Achenbach, T. M. (1980). A typology of child behavior profile patterns: distribution and correlates for disturbed children aged 6–16. *Journal of Abnormal Child Psychology* **8**, 441–470.
- Everitt, B. J. (1980). *Cluster Analysis*, 2nd edn. Halsted Press: New York.
- Feske, U., Perry, K. J., Chambless, D. L., Renneberg, B. & Goldstein, A. J. (1996). Avoidant personality disorder as a predictor for severity and treatment outcome among generalized social phobics. *Journal of Personality Disorders* **10**, 174–184.

- Hair, J. F., Anderson, R. E., Tatham, R. L. & Black, W. C. (1995). Cluster analysis. In *Multivariate Data Analysis With Readings* (ed. J. F. Hair, R. F. Anderson, R. L. Tatham and W. C. Black), pp. 420–456. Prentice Hall: Englewood Cliffs, NJ.
- Hamilton, M. (1959). The assessment of anxiety states by rating. *British Journal of Medical Psychology* **32**, 50–55.
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery, and Psychiatry* **23**, 56–62.
- Hart, T. A., Jack, M. S., Turk, C. L. & Heimberg, R. G. (1999). Issues for the measurement of social anxiety disorder. In *Social Anxiety Disorder* (ed. H. G. M. Westenberg and J. A. Den Boer), pp. 133–155. Syn-Thesis Publishers: Amsterdam.
- Hartigan, J. (1975). *Clustering Algorithms*. John Wiley: New York.
- Heimberg, R. G. (1996). Social phobia, avoidant personality and the multiaxial conceptualization of interpersonal anxiety. In *Trends in Cognitive and Behavioral Therapies, Vol. 1* (ed. P. Salkovskis), pp. 43–61. John Wiley & Sons Ltd.: Chichester.
- Heimberg, R. G. & Holt, C. S. (1989). The issue of subtypes in the diagnosis of social phobia: a report to the social phobia subworkgroup for DSM-IV. (Unpublished manuscript.)
- Heimberg, R. G., Hope, D. A., Dodge, C. S. & Becker, R. E. (1990). DSM-III-R subtypes of social phobia: comparison of generalized social phobias and public speaking phobias. *Journal of Nervous and Mental Disease* **178**, 172–179.
- Heimberg, R. G., Holt, C. S., Schneier, F. R., Spitzer, R. L. & Liebowitz, M. R. (1993). The issue of subtypes in the diagnosis of social phobia. *Journal of Anxiety Disorders* **7**, 249–269.
- Heimberg, R. G., Liebowitz, M. R., Hope, D. A., Schneier, F. R., Holt, C. S., Welkowitz, L., Juster, H. R., Campeas, R., Bruch, M. A., Cloitre, M., Fallon, B. & Klein, D. F. (1998). Cognitive-behavioral group therapy versus phenelzine in social phobia: 12-week outcome. *Archives of General Psychiatry* **55**, 1133–1141.
- Heimberg, R. G., Horner, K. J., Juster, H. R., Safren, S. A., Brown, E. J., Schneier, F. R. & Liebowitz, M. R. (1999). Psychometric properties of the Liebowitz Social Anxiety Scale. *Psychological Medicine* **29**, 199–211.
- Heimberg, R. G., Stein, M. B., Hiripi, E. & Kessler, R. C. (2000). Trends in the prevalence of social phobia in the United States: a synthetic cohort analysis of changes over four decades. *European Psychiatry* **15**, 29–37.
- Herbert, J. D., Hope, D. A. & Bellack, A. S. (1992). Validity of the distinction between generalized social phobia and avoidant personality disorder. *Journal of Abnormal Psychology* **101**, 332–339.
- Hofmann, S. G., Newman, M. G., Ehlers, A. & Roth, W. T. (1995). Psychophysiological differences between subgroups of social phobia. *Journal of Abnormal Psychology* **104**, 224–231.
- Holt, C. S., Heimberg, R. G. & Hope, D. A. (1992a). Avoidant personality disorder and the generalized subtype of social phobia. *Journal of Abnormal Psychology* **101**, 318–325.
- Holt, C. S., Heimberg, R. G., Hope, D. A. & Liebowitz, M. R. (1992b). Situational domains of social phobia. *Journal of Anxiety Disorders* **6**, 63–77.
- Hope, D. A., Herbert, J. D. & White, C. (1995). Diagnostic subtype, avoidant personality disorder, and efficacy of cognitive behavioral group therapy for social phobia. *Cognitive Therapy and Research* **19**, 285–303.
- Horwath, E., Johnson, J., Hornig, C. D. & Weissman, M. M. (1998). Social phobia diagnostic subtypes and the relationship between social phobia and panic disorder/agoraphobia. In *DSM-IV Source Book, Volume 4* (ed. T. A. Widiger, A. H. Frances, H. A. Pincus, M. J. First, R. Ross and W. Davis), pp. 287–306. American Psychiatric Press: Washington, DC.
- Johnson, M. R. & Lydiard, R. B. (1995). Personality disorders in social phobia. *Psychiatric Annals* **25**, 554–563.
- Kendall, P. C. & Watson, D. (eds.) (1989). *Anxiety and Depression: Distinctive and Overlapping Features*. Academic Press: San Diego, CA.
- Kessler, R. C., Stein, M. B. & Berglund, P. A. (1998). Social phobia subtypes in the National Comorbidity Survey. *American Journal of Psychiatry* **155**, 613–619.
- Lazarsfeld, P. F. & Henry, N. W. (1968). *Latent Structure Analysis*. Houghton Mifflin: Boston, MA.
- Leung, A. W. & Heimberg, R. G. (1996). Homework compliance, perceptions of control, and outcome of cognitive-behavioral treatment of social phobia. *Behaviour Research and Therapy* **34**, 423–432.
- Levin, A. P., Saoud, J. B., Strauman, T., Gorman, J. M., Fyer, A., Crawford, R. & Liebowitz, M. R. (1993). Responses of 'generalized' and 'discrete' social phobics during public speaking. *Journal of Anxiety Disorders* **7**, 207–221.
- Liebowitz, M. R. (1987). Social phobia. *Modern Problems in Pharmacopsychiatry* **22**, 141–173.
- Liebowitz, M. R., Schneier, F. R., Campeas, R., Hollander, E., Hatterer, J., Fyer, A. J., Gorman, J. M., Papp, L., Davies, S., Gully, R. & Klein, D. F. (1992). Phenelzine vs atenolol in social phobia: a placebo-controlled comparison. *Archives of General Psychiatry* **49**, 290–300.
- Loranger, A. W. (1988). *Personality Disorders Examination Manual*. D. V. Communications: Yonkers, NY.
- Mannuzza, S., Fyer, A. J., Klein, D. F. & Endicott, J. (1986). Schedule for Affective Disorders and Schizophrenia-Lifetime Version modified for the study of anxiety disorders (SADS-LA): rationale and conceptual development. *Journal of Psychiatric Research* **20**, 159–168.
- Mannuzza, S., Schneier, F. R., Chapman, T. F., Liebowitz, M. R., Klein, D. F. & Fyer, A. J. (1995). Generalized social phobia: reliability and validity. *Archives of General Psychiatry* **52**, 230–237.
- Mattick, R. P. & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy* **36**, 455–470.
- Marks, I. M. & Matthews, A. M. (1979). Brief standard self-rating for phobic patients. *Behaviour Research and Therapy* **17**, 263–267.
- Milligan, G. (1980). An examination of the effects of six types of error perturbation on fifteen clustering algorithms. *Psychometrika* **45**, 325–342.
- Safren, S. A., Heimberg, R. G. & Juster, H. R. (1997). Client expectancies and their relationship to pretreatment symptomatology and outcome of cognitive-behavioral group treatment for social phobia. *Journal of Consulting and Clinical Psychology* **65**, 694–698.
- Safren, S. A., Turk, C. L. & Heimberg, R. G. (1998). Factor structure of the Social Interaction Anxiety Scale and the Social Phobia Scale. *Behaviour Research and Therapy* **36**, 443–453.
- Safren, S. A., Heimberg, R. G., Horner, K. J., Juster, H. R., Schneier, F. R. & Liebowitz, M. R. (1999). Factor structure of social fears: the Liebowitz Social Anxiety Scale. *Journal of Anxiety Disorders* **13**, 253–270.
- Schneier, F. R., Liebowitz, M. R., Beidel, D. C., Garfinkel, R., Heimberg, R. G., Juster, H., Mannuzza, S., Oberlander, B. E., Turner, S. M., Law, K., Mattia, J. & Orsillo, S. (1998a). MacArthur Data Reanalysis for DSM-IV: Social Phobia. In *DSM-IV source book, Volume 4* (ed. T. A. Widiger, A. H. Frances, H. A. Pincus, M. J. First, R. Ross and W. Davis), pp. 307–328. American Psychiatric Press: Washington, DC.
- Schneier, F. R., Goetz, D., Campeas, R., Marshall, R., Fallon, B. & Liebowitz, M. R. (1998b). Placebo-controlled trial of moclobemide in social phobia. *British Journal of Psychiatry* **172**, 70–77.
- Spitzer, R. L., Williams, J. B. W., Gibbon, M. & First, M. B. (1990). *User's Guide for the Structured Clinical Interview for DSM-III-R (SCID)*. APA: Washington, DC.
- Spitzer, R. L., Williams, J. B. W., Gibbon, M. & First, M. B. (1992). The Structured Clinical Interview for DSM-III-R (SCID). I. History, rationale, and description. *Archives of General Psychiatry* **49**, 624–629.
- SPSS, Inc. (1998). *SPSS Base User's Guide*. SPSS Inc.: Chicago.
- Stein, M. B., Walker, J. R. & Forde, D. R. (1996). Public speaking fears in a community sample: prevalence, impact on functioning, and diagnostic classification. *Archives of General Psychiatry* **53**, 167–174.
- Task Force on DSM-IV, American Psychiatric Association (1991).

- DSM-IV Options Book: Work in Progress 9/1/91*. APA: Washington, DC.
- Turner, S. M., Beidel, D. C. & Townsley, R. M. (1992). Social phobia: a comparison of specific and generalized subtypes and avoidant personality disorder. *Journal of Abnormal Psychology* **101**, 326–331.
- Ward, J. H. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association* **58**, 236–244.
- Watson, D. & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology* **33**, 448–457.
- Widiger, T. A. (1992). Generalized social phobia versus avoidant personality disorder: a commentary on three studies. *Journal of Abnormal Psychology* **101**, 340–343.
- Wittchen, H. U., Stein, M. B. & Kessler, R. C. (1999). Social fears and social phobia in a community sample of adolescents and young adults: prevalence, risk factors and co-morbidity. *Psychological Medicine* **29**, 309–323.