Field Dependence and the Factor Structure of the General Health Questionnaire in Normal Subjects

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Summary: The factor structure of the General Health Questionnaire (GHQ) was investigated in a non-clinical sample in relation to the role of field dependence (assessed by the Hidden Figures Test) in influencing the extent to which different aspects of psychoneurotic disturbance are differentiated. Greater differentiation was achieved by the field independent (FI) group than by the field dependent (FD) group, as shown by: (i) the proportion of variance accounted for by the general factor in the principal components analysis of the 60-item GHQ data was lower (17 per cent) in the FI group than in the FD group (33 per cent); (ii) the factor loadings in the FI group, but not the FD group, corresponded closely with the four subscales of the 28-item scaled GHQ; (iii) the interscale correlations were significantly lower in the FI group than in the FD group. The implications of these findings are discussed, particularly their relevance to 'unitary' and 'distinct-syndrome' models of minor anxiety and depressive disorders, and the greater probability of occurrence of mixed states in field dependent subjects.

Self-report symptom inventories which assess psychiatric disturbance on several subscales representing different aspects of psychoneurotic disorder have been widely used to compare different groups for research and clinical purposes (inter alia Goldberg and Finnerty, 1979; Haines et al, 1980; Howell and Crown, 1971; Weise et al, 1980). However, although the need for subscales which discriminate between different clinical conditions was recognized at an early stage (Crown and Crisp, 1966), this aim has been achieved only to a limited extent. In spite of extensive selection and validation of items, relatively high correlations (ranging between 0.30 and 0.75) have consistently been reported between subscales which purport to measure different aspects of neurotic disturbance. This is true, for instance, of the General Health Questionnaire (GHQ) (Goldberg and Hillier, 1979), the Crown–Crisp Experiential Index (CCEI) (Crown and Crisp, 1979), the Hopkins Symptom Check List (HSCL) (Hoffmann and Overall, 1978) and the anxiety/depression scales of the Delusions-Symptoms-States Inventory (Bedford and Foulds, 1978).

This high degree of intercorrelation between subscales reflects the presence of a large general factor which emerges when multivariate techniques are used in the analysis of symptom checklist data. In the initial development of the General Health Questionnaire, 93 items were analysed and the first factor was found to account for 46 per cent of the variance in the unrotated principal components solution (Goldberg, 1972). The corresponding figure from analysis of the 60-item version of the GHQ was 35 per cent (Goldberg and Hillier, 1979), while Banks et al (1980) found values between 34 per cent and 48 per cent for the 12-item GHQ. In these, and other factor-analytic studies of the GHQ (Goldberg et al, 1976; Worsley and Gribbin, 1977; Worsley et al, 1978), it was found that in the unrotated principal components analysis almost all items loaded significantly on the first factor, which thus represents a global assessment of self-reported psychiatric disturbance.

Similar findings have been reported for the CCEI, and for the Hopkins Symptom Checklist. Williamson et al (1976) found that the unrotated first factor in the principal components analysis of responses of male subjects to the CCEI, (formerly known as the Middlesex Hospital Questionnaire) accounted for 36 per cent of the variance, although Bagley (1980) reported a rather lower value. The HSCL in its various forms has been the subject of a number of factor-analytic studies (e.g. Derogatis et al, 1972a; Lipman et al, 1979; Mattsson et al, 1969). For the 90-item version, Hoffmann and Overall (1978) reported an unrotated general factor, accounting for 28 per cent of the variance (more than twice as much as the next six
corresponding to specific aspects of psychiatric patients of higher social classes than from those of factor solution) in self-report HSCL data from effects of training, Mattsson et al. (1969) suggested disorder emerged more clearly (in that they accounted by Derogatis et al. (1971) who found that factors combined) in a factor analysis of data obtained from psychiatric outpatients.

Thus both simple correlational techniques and multivariate analyses show that subjects do not respond to symptom checklists in a manner corresponding to the symptom patterns perceived by psychiatrists as characterizing particular disorders, but in a more global and undifferentiated manner. The evidence suggests that this is a general feature of self-report symptom checklists, rather than simply a deficiency in the discriminating power of the items of a particular checklist. Hoffmann and Overall (1978) question whether the HSCL-90 provides a valid basis for discriminating different aspects of psychopathology, or whether it actually represents no more than a global index of psychological distress and this doubt clearly applies equally to other self-report inventories.

In particular, anxiety and depression tend to show strongly overlapping symptom patterns, and factor analytic studies of self-report data from both normal and clinical groups have generally failed to identify clearly separate factors associated with symptoms of anxiety and depression (Bagley, 1980; Goldberg et al., 1976; Mattsson et al., 1969; Overall, 1980; Worsley et al., 1978). This difficulty in separating the symptom configurations associated with minor anxiety and depressive disorders has led to the use in clinical practice of 'mixed anxiety depression' diagnoses (Downing and Rickels, 1974); and to a long-standing controversy (see, for instance, Derogatis et al., 1972b) as to whether, in terms of symptomatology, the two disorders should be regarded as discrete clinical entities (the distinct syndrome model), or as variations within a single neurotic syndrome (the unitary model).

Although the general problem of differentiating separate aspects of psychopathology appears to be common to all self-report checklists, differences have been shown to exist between different groups of subjects in the extent to which symptom dimensions can be discriminated. In particular, evidence suggests that psychiatrists' assessments of symptomatology are more finely differentiated than the self-reports of patients (Downing and Rickels, 1974; Leff, 1978; Overall and Woodward, 1975; Raskin et al., 1967). Whilst these findings might be ascribed in part to the effects of training, Mattson et al. (1969) suggested that differences in social class also influence the degree of discrimination achieved. This was confirmed by Derogatis et al. (1971) who found that factors corresponding to specific aspects of psychiatric disorder emerged more clearly (in that they accounted for a higher proportion of the variance in the rotated factor solution) in self-report HSCL data from patients of higher social classes than from those of patients in lower social classes, and most clearly in the psychiatrists' ratings of the patients.

The present author found that individual differences in cognitive style, specifically field dependence/field independence (Witkin et al., 1974), influenced the extent to which normal subjects discriminated particular symptoms as being associated with anxiety, depression and irritability (Parkes, 1981). The method adopted was similar to that used by Leff (1978) who compared the degree of differentiation achieved by patients and psychiatrists. Field dependent subjects showed highly correlated symptom configurations similar to those of the patients in Leff's study; while field independent subjects showed more clear-cut symptom discrimination, closely comparable to that achieved by the psychiatrists.

The relevance of the dimension of field dependence/field independence to symptom differentiation lies in the fact that measures of field dependence assess the ability of individuals to perceive and categorize elements of their environment, whether internal or external, as discrete and separate from their contextual background. Field independent (FI) individuals tend to be perceptually analytical and discriminating, while field dependent (FD) individuals are characterized by a holistic and global mode of perception (Witkin et al., 1971). Studies of field dependence have shown, for instance, that, as compared with FD subjects, FI subjects are more able to organize and impose structure on ambiguous material (Witkin et al., 1974), perceive task characteristics differently (Stone, 1979), are more sensitive to changes in discrete task characteristics (Barrett et al., 1975), are more reactive to specific pain stimuli (Morgan and Horstman, 1978; Sweeney and Fine, 1965); and have a more clearly defined body concept (Corah, 1965). Evidence also suggests that FI individuals are less likely than FD individuals to experience certain health problems, such as obesity (Karp and Pardes, 1965) and alcoholism (Karp et al., 1965).

This dimension of cognitive style also has implications for interpersonal behaviour in that, as reviewed by Witkin and Goodenough (1977), FD individuals tend to be more influenced by others in forming attitudes and judgments; to be particularly attentive to faces as sources of information in interpersonal situations; to be more likely to achieve consensus outcomes in group conflict situations; to prefer greater physical proximity to other people in social interactions; and to be less likely to express hostility directly towards others. Overall, FD individuals tend to show characteristics of interpersonal warmth, empathy and consideration for others, and to prefer occupations which involve working with other people.

The results reported by Parkes (1981) are consistent
with the view that field dependent subjects do not perceive certain patterns of symptoms as discrete and distinguishable entities but experience symptoms as global and undifferentiated psychological disturbance. If so, it would be expected that such subjects would show more generalized responses to self-report symptom checklists than field independent individuals and this difference may underly some of the psychometric findings reviewed above. More importantly, this possibility also has potential implications for the issue of whether anxiety states and depressive disorders are more appropriately represented by a unitary or a distinct-syndrome model of symptomatology. The apparent incompatibility of these two models is resolvable if they are regarded as appropriate to opposite poles of a field dependence/field independence continuum; the global, undifferentiated symptom experiences of field dependent individuals corresponding to a unitary model, and the differentiated symptom patterns of field dependent individuals to a distinct-syndrome model. From a clinical viewpoint, the experience of symptomatology is global and diffuse, while field independent individuals would be more likely to occur in field dependent individuals whose experience of symptomatology is global and diffuse, while field independent individuals would be more likely to show discrete symptom configurations characteristic of either anxiety or depression.

The role of field dependence in influencing the extent to which symptom configurations are differentiated in responses to self-report checklists thus merits investigation. It is predicted, from the discussion above, that data from field dependent subjects would show a greater proportion of variance accounted for by a general factor and high correlations between separate subscales, than corresponding data from field independent subjects. In the present study this prediction was tested by examining the factor structure and the interscale correlations of the 60-item General Health Questionnaire (Goldberg, 1972) in field dependent and field independent normal subjects.

Method

Subjects

The subjects in this study were three successive intake groups of female student nurses attending an introductory course in nursing at the start of their training. Almost all were between the ages of 18–26 years and were of British or Irish nationality. A total of 164 students participated but three were omitted from the analysis as their GHQ responses were incomplete.

Test materials

General Health Questionnaire (Goldberg, 1972): The 60-item version of this inventory was used, and it was scored by the Likert scoring method, i.e. each symptom was scored on a four-point, 0–1–2–3, scale according to the level of distress reported. Scores were also calculated for each of the four 7-item subscales (somatic, anxiety and insomnia, social dysfunction, and severe depression) derived by Goldberg and Hillier (1979).

Hidden Figures Test (Health Sciences Department, University of Toronto): This measure of field dependence is similar in concept to the Group Embedded Figures Test (Witkin et al, 1971). It consists of a set of 32 complex geometric figures, in each of which one of five simple figures, shown at the top of the page and designated A, B, C, D and E, is embedded. In the present work only the 16 odd-numbered items were used, and a letter below each indicated which simple figure was embedded in it. The subjects' task was to identify the simple figure and to indicate it by outlining and rough cross-hatching. After preliminary familiarization with the task, the subjects were given five minutes to complete as many of the 16 items as possible. The score for each subject was the number of items correctly identified. A median split was used to divide the subjects into two groups, a field dependent group (FD), with scores in the range 0–5 (n = 78), and a field independent group (FI) with scores in the range 6–16 (n = 83).

Data analysis

Factor analysis: Principal components analysis (with unities in the diagonals) was used to determine the eigenvalues and the proportion of variance accounted for by each of the unrotated factors, separately in the FI and FD groups. Varimax rotation was carried out to examine the rotated factor structures. The criterion for an item to be regarded as loading significantly on a factor was taken as 0.35.

Correlational analysis: Pearson's r was used to calculate the correlations between scales scores and differences between the corresponding interscale correlations in the FI and FD groups were tested by means of Fisher's transformation.

Results

(i) Overall levels of symptomatology: the proportion of potential 'cases' (scores of 12 or greater, using the 0–0–1–1 GHQ scoring method) in the group was 21.7 per cent, which compares closely with the value (21.1 per cent) reported by Finlay-Jones and Burvill (1977) for females of the same age group in a large-scale community survey. The mean Likert scores for the GHQ–28 total, and the four subscales were: 16.8 ± 9.9 (GHQ–28 total), 5.0 ± 3.6 (somatic complaints), 4.1 ± 3.6 (anxiety and insomnia), 6.0 ± 2.5
(social dysfunction) and 1.7 (± 3.10) (severe depression). There were no significant differences in mean scores between the FI and FD groups.

(ii) Principal components analysis of the 60-item GHQ: the main results of the principal components analyses are shown in Table I. Overall, 25 per cent of the total variance is accounted for by the first factor, but in the FD group the value is almost twice as large as in the FI group. Consistent with this, examination of the unrotated factor matrices showed that in the FD group the average loading on the first factor was 0.55 ± 0.15, whereas in the FI group the corresponding value was 0.37 ± 0.18. In contrast, each of the following six factors (which represent specific components) accounts for a larger proportion of the variance in the FI group, as compared with the corresponding value in the FD group. Whereas 49 per cent of the variance is accounted for by the first four factors in the FD group, the same proportion of the total variance requires seven factors in the FI group. These results indicate that among FD subjects a greater proportion of the variance is due to generalized responses, and a lesser proportion to differentiated responses, than among the FI subjects. This is also consistent with the larger number of factors which had eigenvalues greater than 1.0 in the FI group (19) as compared with the FD group (14).

(iii) Principal components analysis of the 28-item GHQ: the main purpose of this analysis was to compare the four-factor solution in the FI and FD groups with the data reported by Goldberg and Hillier (1979) in deriving a scaled version of the GHQ. The principal components analyses of the data for the 28-item subset yielded results analogous to those described above. In the FD group the first four factors together accounted for 59 per cent (first factor, 36 per cent), while in the FI group the corresponding values were 49 per cent (first factor, 22 per cent). Varimax rotation of the first four factors, carried out separately for the FI and FD groups, showed that the four subscales derived by Goldberg and Hillier emerged more clearly in the factor matrix for the FI group than in that for the FD group. The factor loadings on each of the 28 items are shown in Table II for the two groups.

In the FI group, the items of each subscale load strongly on their respective factors, with the exception of one item (No. 18) which fails to load on any of the four factors, and one item from the severe depression subscale (No. 58), which loads on the anxiety factor more highly than on the severe depression factor. In contrast, the FD group shows a more confused picture, with none of the subscales loading entirely on one factor; nine items loading significantly on more than one factor (as compared with only two in the FI group); and with generally higher loadings than in the FI group on factors other than that to which the item is assigned. In that the 'simple' factor pattern stands out clearly against the background of random variation in the FI group data but tends not to do so in the FD group data, the appearance of Table II can be regarded as analogous to the way the FI and FD groups perceive the items of the Hidden Figures Test.

(iv) Comparison of subscale intercorrelations in the FI and FD groups: Product-moment correlations were calculated between the GHQ–28 total and each of the four subscales, and between each pair of subscales,
corresponding correlations in the Fl and FD groups. as compared with the field independent group, would respect. population groups may underly the various results
difference between the Fl and FD groups in this that differences in field dependence between different aspects of disturbance. These findings extend the results described above are in accordance with the prediction that the field dependent subject group, as compared with the field independent group, would show more generalized GHQ responses, as indicated by a higher loading on the first unrotated factor in the principal components analysis, and a higher degree of intercorrelation among the subscales measuring different aspects of disturbance. These findings extend the results of a previous study (Parkes, 1981) on field dependence and symptom differentiation, and suggest that differences in field dependence between different population groups may underly the various results.
Product-moment correlations between GHQ subscales in Fl and FD groups

<table>
<thead>
<tr>
<th></th>
<th>Scaled GHQ 28-item total</th>
<th>Somatic complaints</th>
<th>Anxiety and insomnia</th>
<th>Social dysfunction</th>
<th>Severe depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaled GHQ 28-item total</td>
<td>—</td>
<td>P &lt; 0.01</td>
<td>P &lt; 0.001</td>
<td>P &lt; 0.025</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Fl</td>
<td>0.70</td>
<td>—</td>
<td>P &lt; 0.001</td>
<td>P &lt; 0.05</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>FD</td>
<td>0.85</td>
<td>0.29</td>
<td>P &lt; 0.01</td>
<td></td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td>Anxiety and insomnia</td>
<td>Fl</td>
<td>0.90</td>
<td>0.70</td>
<td>P &lt; 0.05</td>
<td>P &lt; 0.05</td>
</tr>
<tr>
<td></td>
<td>FD</td>
<td>0.57</td>
<td>0.27</td>
<td>0.25</td>
<td>—</td>
</tr>
<tr>
<td>Social dysfunction</td>
<td>Fl</td>
<td>0.75</td>
<td>0.52</td>
<td>0.58</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td></td>
<td>FD</td>
<td>0.61</td>
<td>0.24</td>
<td>0.43</td>
<td>0.17</td>
</tr>
<tr>
<td>Severe depression</td>
<td>FD</td>
<td>0.80</td>
<td>0.50</td>
<td>0.64</td>
<td>0.50</td>
</tr>
</tbody>
</table>

n = 78 (FD group); n = 83 (Fl group).

The significances of the differences between corresponding product-moment correlations in the Fl and FD groups are shown in the upper right portion of the table (one-tail tests).

Reported from studies of factor structure and subscale intercorrelations in self-report symptom checklist data. The findings are also of significance in relation to more general issues involved in the assessment and classification of neurotic disturbance.

The results of the present study tend to confirm the view that a distinct-syndrome model of anxiety and depressive disorders represents the experience of field independent subjects, who perceive symptom configurations as distinguishable entities; while the unitary model corresponds more closely to the experience of field dependent subjects whose global mode of perception is reflected in a failure to differentiate separate aspects of neurotic distress. Consequently, the extent to which either model is appropriate to any particular set of data will be influenced by the degree of field dependence in the subject group as a whole. From a clinical viewpoint, the results of the present study suggest that mixed neurotic states are more likely to be presented by field dependent subjects and more clear-cut symptom configurations characteristic of either anxiety or depression by field independent subjects. Self-report assessment techniques would be expected to accentuate this tendency, since these preclude the use of external sources of information (such as cues from the interviewer) to facilitate the structuring of responses by field dependent individuals.

Studies of field dependence have shown social class differences, higher social classes being more field independent, (Gruenfeld and MacEachron, 1975); sex differences, males being more field independent than females (Maccoby and Jacklin, 1974); and differences between occupational groups, psychiatrists being among those groups who tend to be field independent (Witkin and Goodenough, 1977). Similar factors, as reviewed above, have been found to influence the degree to which symptoms are differentiated in different groups. Relative to the population as a whole, unselected psychiatric patient groups tend to be predominantly female and predominantly of lower social class. Thus it would be expected that patients' responses to self-report checklists would show less differentiation between symptom patterns than would be found in data from a normal population.

Some evidence of this has been reported. Finlay-Jones (1980) suggested, from a review of the literature, that mixed anxiety/depression predominates among declared patients, whereas single syndromes appear more frequently in community samples. More specifically, Crown and Crisp (1979) showed that the average correlation between subscales of the CCEI was lower in normal groups than in out-patient groups, while Cockett (1969) reported particularly high correlations between the subscales of the MHQ in assessment data collected at a remand centre. He attributed this to the subjects' tendency to generalize...
awareness of symptoms, an explanation which is consistent with the finding that prisoners tend to be markedly field dependent (Witkin et al., 1974, p. 186). In the present study, the proportion of variance accounted for by the general factor in the FD group was closely comparable to that reported for GHQ data obtained from general practice patients (Goldberg and Hillier, 1979). Although other differences, for instance, in symptom intensity, may also be of relevance in comparing clinical and normal groups (Mendels et al., 1972), the present study demonstrates the significance of the role of field dependence in influencing the extent to which individuals are able to discriminate symptom patterns.

The results of the present study also provide information about the factor structure of the GHQ in a non-clinical population and raise some psychometric points. In both the FI and FD groups, the correlations between the anxiety/insomnia and severe depression subscales from the 28-item GHQ were relatively high. This was due in part to the fact that, not only in the FD group but also in the FI group, the factor loadings were not consistent with the subscales to which the items had been assigned in the scaled GHQ. In particular, one item (Have you recently found that at times you couldn’t do anything because your nerves were too bad?) loaded on the anxiety factor in both the FI and FD groups, whereas Goldberg and Hillier (1979) had included it on the depression subscale in spite of some ambiguity in the factor loadings. Factor analysis of the 60-item GHQ data in the present study resulted in a more specific 5-item suicidal depression scale which, in the FI group, showed clearer differentiation from anxiety than the Goldberg and Hillier severe depression subscale.

Although the overall GHQ scores were closely similar to those of females in the same age group in the survey reported by Finlay-Jones and Burvill (1977), the mean scores on the severe depression subscale were low relative to the other subscales. For the majority of normal subjects items relating to suicidal tendencies are unlikely to be of great relevance and comments written against these items by some of the subjects in the present study suggested that they gave rise to some concern. However, there was no empirical evidence that the nature of the severe depression items led to particularly defensive responses, resulting in selective distortion of the pattern of subscale scores. As reported elsewhere (Parkes, 1980), all the subscales were influenced by defensiveness to approximately the same extent, with the exception of the somatic complaints subscale which was not affected.

Identification of individual differences in perceptual style as one factor underlying failure to differentiate symptom patterns raises the question of whether discrimination by FD subjects could be facilitated by changes in the content or format of items. For instance, Mendels et al. (1972) suggest that a forced-choice format, pairing two different types of symptoms, might be more effective than conventional Likert scales. Another approach might be to seek items which consistently showed unambiguous factor loadings in data from subject groups assessed as markedly field dependent. However, since the concept of field dependence relates to individual differences in the nature of perceptual experience, it seems unlikely that modification of questionnaire items would prove of more than limited value in enhancing the extent to which field dependent individuals discriminate symptoms on self-report checklists.

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