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The Four-Dimensional Symptom Questionnaire (4DSQ): measuring distress and other mental health problems in a working population

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In non-clinical (working) populations it is important to differentiate between general distress, on the one hand, and psychiatric symptoms — depression, anxiety and somatization — on the other hand. The Four-Dimensional Symptom Questionnaire (4DSQ) is a new instrument that measures these four symptom dimensions (Terluin, 1996). This study aimed to investigate the psychometric properties of the 4DSQ in a working population. A postal stress and health survey was sent to all employees of a Dutch telecom company, 51% of whom responded ($N = 3852$). The mailing included the 4DSQ, a set of questionnaires concerning job stress (e.g. psychological demands), coping style (e.g. problem-focused coping, avoidant coping), and indicators of strain (e.g. emotional exhaustion, fatigue). Cronbach's α for the four sub-scales of the 4DSQ ranged from .79 to .90. Factor analysis showed four factors corresponding to the four scales of the 4DSQ: distress, depression, anxiety, and somatization. The validity of the 4DSQ was assessed using (partial) correlations with job stress, coping, and strain. As expected, the distress scale showed the strongest correlations with the indicators of strain, as well as with job stress and coping. In conclusion, the 4DSQ is a reliable and valid instrument that can be used in a working population to distinguish between stress-related symptoms and psychiatric illness.

1. Introduction

1.1. Background

Psychological health complaints are highly prevalent, both in the community and in general medical settings (Goldberg & Huxley, 1992). Based on data obtained from screening questionnaires, such as the General Health Questionnaire (GHQ; Goldberg & Williams, 1988), Verhaak (1995) reported the prevalence of psychological distress in the western

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world to be 15−25% in the community, and 25−45% in general practice. Also based on the GHQ, a 23% prevalence of psychological distress has been established in a Dutch working population of 12 000 employees (Bültmann *et al.*, 2002). In most cases these complaints do not fit into a psychiatric classification system such as the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV; American Psychiatric Association, 1994) or the International Classification of Diseases, tenth edition (ICD-10; World Health Organization, 1992). In fact, most people with psychological complaints are affected by the adverse effects of life stress, and only a minority suffers from psychiatric illness (Heath, 1999; Middleton & Shaw, 2000).

In primary care patients, Terluin (1994) identified four symptom dimensions that proved to be necessary and sufficient to describe the whole range of common psychological complaints: 'distress', 'depression', 'anxiety' and 'somatization'. The 'distress' dimension represents symptoms that result from the strain that is elicited by a stressor, as well as from the effort that has to be put into dealing with that stressor and maintaining an acceptable level of psychosocial functioning (Lazarus, 1980). The 'depression' dimension represents depressive thoughts (including suicidal ideation) and loss of pleasure (anhedonia), i.e. symptoms that are characteristic of clinical depression (i.e. mood disorder) (Beck, Rush, Shaw, & Emery, 1979; Snaith, 1987). The 'anxiety' dimension encompasses symptoms such as free-floating anxiety, panic attacks, phobic anxiety, and avoidance behaviour, i.e. symptoms that are characteristic of clinical anxiety (i.e. anxiety disorder; American Psychiatric Association, 1994). The 'somatization' dimension comprises 'psychosomatic' symptoms that represent bodily stress reactions when they are relatively few and mild, but psychiatric illness (i.e. somatization disorder or hypochondria) when the complaints are many and disruptive (Clarke & Smith, 2000; Katon *et al.*, 1991).

Terluin (1996) developed the Four-Dimensional Symptom Questionnaire (4DSQ) in order to measure these four symptom dimensions. In general practice, the 4DSQ enables the physician to distinguish between psychiatric illness and uncomplicated stress-related disorders (Terluin, 1998). Although the 4DSQ was originally developed for use in primary care, it may also be useful in an occupational health care setting, e.g. in work stress surveys, and as a diagnostic tool to assess employees who are on sick leave for psychological reasons. In order to evaluate its reliability and validity in a working population, we included the 4DSQ in an occupational health survey among the employees of a large Dutch telecom company.

1.2. *Conceptual framework*

Figure 1 outlines the conceptual framework of stress, distress, and psychiatric illness that is used in this paper. Essentially, this model distinguishes between distress and psychiatric illness. More specifically, distress is what people generally experience when they are 'under stress', whereas psychiatric illness is characterized by specific mental symptoms, such as anhedonia in the case of depressive illness, or uncontrollable fears in the case of anxiety disorder. With the word 'stressors' we refer to events or situations that potentially threaten a person's well-being and habitual functioning. The direct effects of these stressors in terms of the psycho-biological changes in the individual are called 'strain'. Some changes, such as elevated blood pressure and altered immune responses, may go unnoticed by the individual under stress for a long time. Other changes, such as reduced energy, tachycardia, and increased muscle tone, are more readily perceived, e.g. as fatigue, heart pounding, and myalgia. Distress refers to the psychological sequelae of strain. One component of distress is the conscious experience of strain that motivates a person to apply coping behaviour
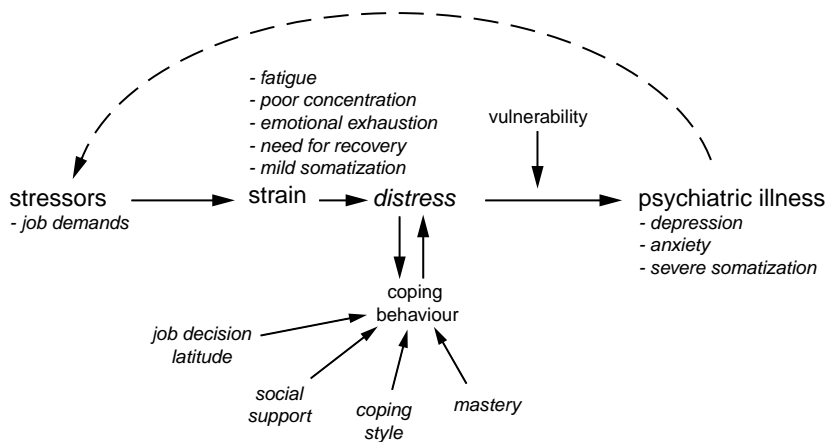
Figure 1. Conceptual model of stress, distress, and psychiatric illness. Measured variables are in italics.

in order to minimize the influence of the stressor, and to mitigate strain and distress (Lazarus, 1980). However, the appraisal of the situation and the effort that a person has to put into coping with the situation may also contribute to the distress. Worrying is an example of coping behaviour that usually increases distress. Hence, the experience of distress results partly from the strain and partly from the coping behaviour it promotes. To a certain extent, strain and distress are overlapping concepts. For instance, fatigue and poor concentration are clearly indicators of strain, but at the same time these symptoms are part of the subjective experience of distress.

While successful coping results in less distress, unsuccessful coping results in increased distress. Severe distress may ultimately result in a breakdown of coping, i.e. demoralization (Frank, 1973; Kates & Craven, 1998). This condition is generally called a 'nervous breakdown' by lay people, when they feel themselves unable to maintain their habitual level of social functioning (Pfeffer & Waldron, 1987; Rapport, Todd, Lumley, & Fisicaro, 1998). Interestingly, general practitioners and occupational physicians in the Netherlands use the term 'nervous breakdown'—also indicated by the French word 'surmenage' (i.e. 'over-strain')—as a diagnostic label in much the same way (Terluin, Gill, & Winnubst, 1992). Indeed, patients who suffer from a 'nervous breakdown' are characterized by severe distress symptoms (Terluin, 1994).

In some people, however, distress may cause psychiatric illness, depending on the presence of certain vulnerability factors that may be biological or psychological in nature (Dohrenwend, 1998; Mazure & Druss, 1995; Surtees & Wainwright, 1999). In turn, psychiatric illness may act as a stressor that increases strain and distress. Therefore, individuals with mood or anxiety disorders exhibit a combination of distress and depression, or distress and anxiety symptoms (Clark & Watson, 1991), along with a variable degree of somatization symptoms (Simon & Von Korff, 1991).

People suffering from a 'nervous breakdown' need reassurance and counselling with respect to their life stress, and generally have a favourable prognosis (Van der Klink, Blonk, Schene, & Van Dijk, 2003). On the other hand, individuals suffering from a psychiatric illness often need pharmacological intervention and specialized mental health care, and generally have a less favourable prognosis. While distress is something that every person experiences at some point in time, not everyone will experience a psychiatric illness.

Since this paper focuses on employees, psychological job demands are considered to be stressors, and fatigue, poor concentration, emotional exhaustion and need for recovery are classified as indicators of strain. Furthermore, coping style, job decision latitude, social support and mastery are considered to be determinants of coping behaviour. Coping behaviour, which is an important element of the model, was not included in the present research. It should be noted, however, that we did not intend to test the model depicted in figure 1. In this paper we focus on the psychometric properties of the 4DSQ. The model is presented as a conceptual framework to predict relationships between the 4DSQ scales and other variables. The model will now be described in more detail.

Psychological job demands refer to psychological stressors involved in accomplishing the work load, stressors related to unexpected tasks, and stressors of job-related personal conflict (Karasek, 1979). Although job demands are not necessarily negative, they may become job stressors when the effort required to meet those demands is high, and is therefore associated with high physiological and/or psychological costs that elicit distress. Accordingly, our model predicts a positive relationship between job demands and distress that is stronger than the relationship between job demands and psychiatric illness (depression, anxiety, and somatization). Moreover, the model predicts that the relationship between job demands and psychiatric illness is mediated by distress.

Job decision latitude refers to the employees' potential control over their tasks and the way in which they handle their work during the working day (Karasek, 1979). Job decision latitude increases the employee's possibilities to choose the most appropriate coping behaviour. Therefore, our model predicts a negative relationship between job decision latitude and distress that is stronger than that between job decision latitude and psychiatric illness, and that the relationship between job decision latitude and psychiatric illness is mediated by distress.

Social support refers to the perceived emotional and instrumental support received from co-workers and supervisors. Our model of stress, distress and psychiatric illness predicts a negative relationship between social support and distress that is stronger than that between social support and psychiatric illness, and that the relationship between social support and psychiatric illness is mediated by distress. Hence, our expectations are in accordance with the Demand-Control-Support model that predicts high levels of distress when job demands are high, decision latitude is low, and social support is poor (Karasek *et al*., 1998).

People have many different ways of coping with the burdens that life puts upon them. Some ways of coping are more successful than others, also depending on the specific stressor(s) involved. Moreover, people are known to have certain preferences for the way in which they usually deal with their duties and difficulties; this is referred to as *coping style* (Schreurs, Van de Willige, Tellegen, & Brosschot, 1988). A number of coping styles have been found to be positively or negatively related to distress. For instance, 'emotional coping' refers to disclosing, expressing, and acting-out one's emotions; 'avoidant coping' refers to a tendency to avoid being confronted with problems; 'palliative coping' refers to efforts to control negative emotions by means of distraction, or the use of psychoactive substances; 'problem-focused coping' refers to confronting the stressors and actively trying to find solutions; 'social coping' refers to seeking help and comfort from others (Schreurs *et al*., 1988). Generally speaking, 'approach coping' (i.e. problem-focused coping) (Roth & Cohen, 1986) is associated with lower levels of distress (Higgins & Endler, 1995). On the other hand, 'avoidance coping' (i.e. emotional coping, avoidant coping, and palliative coping) (Roth & Cohen, 1986) is generally associated with higher levels of distress (Higgins & Endler, 1995). Social coping is only weakly associated with distress (Penley, Tomaka, & Wiebe, 2002). Our model predicts that the relationships between coping styles and distress

are stronger than those between coping styles and psychiatric illness, and that the relationships between coping style and psychiatric illness are mediated by distress.

Personal psychological resources are considered to buffer negative consequences of psychosocial stressors (Pearlin & Schooler, 1978). The concept of *mastery* refers to a particular personality trait, i.e. the extent to which one regards one's life-changes as being under one's own control, in contrast to being ruled by fate. Our model predicts a relationship between mastery and distress that is stronger than that between mastery and psychiatric illness, and that the relationship between mastery and psychiatric illness is mediated by distress.

Emotional exhaustion is a feeling of being emotionally drained by an excess of (work) stress. It is thought to be a part of the burnout syndrome (Maslach, Schaufeli, & Leiter, 2001). Like emotional exhaustion, *fatigue*, *poor concentration* and *need for recovery* are considered to be manifestations of strain (Beurskens *et al*., 2000; Jansen, Kant, & Van den Brandt, 2002). Our model predicts relationships between these strain indicators and distress that are stronger than those between these strain indicators and psychiatric illness, and that the relationships between these indicators of strain and psychiatric illness are mediated by distress.

2. Methods

2.1. *Participants*

Within the framework of an occupational health survey with special focus on occupational stress, a set of questionnaires was mailed to all employees of a Dutch telecom company ($N = 7522$). An accompanying letter explained that the purpose of the survey was to assess the employees' job stress, health, and well-being. The questionnaires were completed and returned by 3852 employees (a response rate of 51%). The participants differed from the non-participants with respect to age, gender and salary group. The mean age of the participants was 43.9 years (SD = 8.1 years) compared to 40.7 years (SD = 9.3 years) for the non-participants ($p < .001$). Women (9% vs. 14%, $p < .001$) and employees in the lower salary group (41% vs. 53%, $p < .001$) were slightly under-represented.

Accidentally, one of the questionnaires, the Utrecht Burnout Scale (UBOS; see section 2.2) was not included in the mailing to the first 45% of the study population. Employees who had filled in the UBOS differed from the other participants in that women were under-represented (7% vs. 11%, $p < .001$), and blue collar workers were over-represented (45% vs. 35%, $p < .001$). The Checklist Individual Strength (CIS; section 2.2) was sent to a sub-sample of 792 employees as part of an invitation to participate in a stress intervention-prevention programme. The sub-sample consisted of all employees with a 4DSQ Distress score > 10 and an equally large random sample of employees with Distress scores ≤ 10. The CIS was filled in by 361 employees (a response rate of 46%). The median interval between the mailings of the 4DSQ and the CIS was 45 days (range 2–221 days). The employees who had filled in the CIS differed from the other employees in that they had a higher level of education (high level of education 30% vs. 22%, $p < .001$) and a higher job position (blue collar workers 33% vs. 42%, $p < .01$).

2.2. *Measurements*

The following instruments were used in the survey.

- The Dutch version of the Four-Dimensional Symptom Questionnaire (4DSQ) with four scales: Distress (16 items, score range = 0–32); Depression (6 items, score

range $= 0-12$); Anxiety (12 items, score range $= 0-24$); and Somatization (16 items, score range $= 0-32$) (Terluin, 1996). The 50 items are scored on a 5-point response scale using the response categories: 'no', 'sometimes', 'regularly', 'often', and 'very often or constantly'. However, every symptom is rated as absent ('no': 0 points); present at a clinically significant level ('regularly/often/very often': 2 points), or doubtfully present ('sometimes': 1 point). In clinical practice, this trichotomization is more useful than the more differentiated scoring in five categories. In an earlier study in general practice, based on this trichotomization, cut-off points that discriminate between 'cases' and 'non-cases' were established for Distress (score > 10) Somatization (score > 10), Depression (score > 2), and Anxiety (score > 8) (Terluin, 1998). Although we have noticed that most people appreciate the differentiation that a 5-point scoring system offers, a more differentiated way of scoring assigns substantial weight to subjectively experienced severity of the symptoms. Such a scoring system gives room for response tendency, which is related to personality and situational factors. Some people habitually tend to exaggerate, while others tend to belittle their symptoms. Therefore, differences between people in response tendencies may spuriously increase correlations between variables. However, when clinicians are assessing symptoms, trying to arrive at a diagnosis, they tend to ignore most of the subjective colouring of response tendencies. For instance, a clinician translates 'unbearable headache' into 'headache: present'. The 'clinical' way of scoring symptoms therefore implies that the sum-score of the scale reflects primarily the number of symptoms rather than their subjective severity.

- Three scales of the Dutch version of the Job Content Questionnaire (JCQ): Psychological job demands (9 items, Cronbach's $\alpha = .70$), Job decision latitude (9 items, Cronbach's $\alpha = .77$), and Social support (the sum of 'co-worker support' and 'superior support', 8 items, Cronbach's $\alpha = .79$) (Karasek *et al.*, 1998). The response options for each item vary on a 4-point scale from 'strongly disagree' (1) to 'strongly agree' (4). High scores signify high psychological job demands, high decision latitude, and high social support, respectively. We expected positive correlations with the 4DSQ scores for Psychological job demands, whereas we expected negative correlations with the 4DSQ scores for Job decision latitude, and Social support.

- The Utrecht Coping List (UCL), a validated Dutch questionnaire measuring five different habitual coping styles: Emotional coping (2 items, Cronbach's $\alpha = .65$), Avoidant coping (3 items, Cronbach's $\alpha = .67$), Palliative coping (4 items, Cronbach's $\alpha = .68$), Problem-focused coping (5 items, Cronbach's $\alpha = .81$), and Social coping (5 items, Cronbach's $\alpha = .77$) (Schreurs *et al.*, 1988). The 4-point response scale ranges from 'rarely or never' (1) to 'very often' (4). High scores indicate a high tendency to apply the specified coping style. We expected positive correlations with the 4DSQ scores for Emotional coping, Avoidant coping, and Palliative coping, whereas we expected negative correlations with the 4DSQ scores for Problem-focused coping. We had no specific expectations with regard to Social coping.

- The Dutch version of the Pearlin Mastery Scale, a questionnaire with 7 items (Cronbach's $\alpha = .79$) (Pearlin & Schooler, 1978). The items are scored on a 5-point scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). High scores indicate a strong sense of control over one's life, and we expected mastery to correlate negatively with the 4DSQ scores.

- The Need for Recovery scale (Jansen *et al*., 2002), a validated Dutch questionnaire assessing the subjective need for recovery from work at the end of a working day— for example, does the employee still feel fit after supper or is (s)he only able to relax after a second day off work? The Need for Recovery scale consists of 11 dichotomous items: 'yes' (1), 'no' (0) (KR20 coefficient = .87). High scores indicate an increased need for recovery at the end of a working day. We expected Need for recovery to correlate positively with the 4DSQ scores.
- The Emotional exhaustion scale of the Utrecht Burnout Scale (UBOS), a Dutch adaptation of the Maslach Burnout Inventory (MBI; Maslach & Jackson, 1986) with established reliability and validity (Schaufeli & Van Dierendonck, 2000). The Emotional exhaustion scale consists of 5 items with response options varying on a 7-point scale from 'never' (0) to 'every day' (6) (Cronbach's α = .87). High scores indicate a high level of emotional exhaustion. We expected a positive correlation between Emotional exhaustion and the 4DSQ scores.
- The Fatigue and Poor concentration scales of the Checklist Individual Strength (CIS), a validated Dutch multi-dimensional fatigue questionnaire (Beurskens *et al*., 2000). The items are scored on a 7-point scale ranging from 'no, that is not true' (1) to 'yes, that is true' (7). The Fatigue (8 items) and Poor concentration (5 items) scales had Cronbach's α coefficients of .93 and .85, respectively. High scores indicate high levels of fatigue, and impaired concentration, respectively. We expected positive correlations with the 4DSQ scores for both variables.

2.3. *Analysis*

2.3.1. *Descriptives:* Mean scores and standard deviations were calculated for the 4DSQ scales of the study population. Moreover, the variance of the 4DSQ scales associated with age was determined by calculating squared Pearson correlation coefficients. The variance of the 4DSQ scales associated with gender, education and position was investigated by calculating squared Eta (η^2) correlation coefficients. These squared coefficients provide estimates of the proportion of explained variance.

2.3.2. *Reliability:* The reliability of the 4DSQ scales was calculated using Cronbach's internal consistency coefficient α. Cronbach's α is a conservative estimate of the proportion of the observed variance that can be attributed to the 'true score' (Streiner & Norman, 1995).

2.3.3. *Validity:* The present paper mainly focuses on the construct validity of the 4DSQ Distress scale. Construct validity refers to the validity of a theoretical construct such as distress. Since it is impossible to directly measure distress, construct validity depends on demonstrating relationships between tests measuring different phenomena that are assumed (not) to correlate on theoretical grounds (Streiner & Norman, 1995). The correlations between the 4DSQ scales, the factorial structure of the 4DSQ, and the correlations between the 4DSQ scales and job stress, measures of strain, and determinants of coping behaviour, are all aspects of construct validity.

2.3.4. *Correlations between the 4DSQ scales:* Psychological symptom questionnaires tend to correlate with each other, often to a substantial degree (Clark & Watson, 1991). Moreover, our conceptual model predicts correlations between distress and psychiatric symptoms (depression, anxiety, and somatization). Therefore, we expected that the 4DSQ scales are

correlated. The correlations between the 4DSQ scales were investigated by calculating Pearson correlation coefficients, and by studying scatter-plots. Furthermore, we investigated whether or not each of the 4DSQ scales covered some unique domain within the range of common psychopathology. For that purpose, Cronbach's α was calculated on the residuals of the items of the target 4DSQ scale, after subtracting the variance explained by the remaining three 4DSQ scales by means of multiple regression techniques. A Cronbach's α value of the item residuals exceeding .50 indicates that the scale covers a unique part of the symptom spectrum (Dohrenwend, Shrout, Egri, & Mendelsohn, 1980).

2.3.5. *Factorial structure:* The items of the 4DSQ are supposed to tap four underlying symptom 'dimensions'. In order to evaluate the dimensional structure of the 4DSQ we adopted a two-stage approach. First, an exploratory factor analysis (EFA) was performed on a randomly selected half of the sample. The factors were extracted by means of principal components, and their number was *a priori* limited to four. The factors were then rotated, using the varimax method. Second, the data of the remaining half of the sample was subjected to a confirmatory factor analysis (CFA), using the AMOS software programme (Arbuckle, 1997). The hypothesized 4-factor model of the 4DSQ was first tested and compared to a 1-factor model that assumes that all items load on one single underlying 'general well-being' dimension. Based on the so-called Modification Indices, alternative or adjusted models were tested to identify causes of imperfection in the 4-factor model. The goodness-of-fit of the models was evaluated using the following indices: the χ^2 goodness-of-fit statistic, the Root Mean Square Error of Approximation (RMSEA), the Goodness-of-Fit Index (GFI), the Adjusted Goodness-of-Fit Index (AGFI), the Normed Fit Index (NFI), the Tucker Lewis Index (TLI), and the Comparative Fit Index (CFI; Jöreskog & Sörbom, 1986; Marsh, Balla, & Hau, 1996). Non-significant χ^2 values indicate that the hypothesized model fits the data. However, this index is sensitive to sample size, implying that the probability of rejecting a hypothesized model increases as the sample size increases (Bentler, 1990). A RMSEA value smaller than .08 is indicative of an acceptable fit (Cudeck & Browne, 1993). As a rule of thumb, NFI, TLI, and CFI values greater than .90 indicate a good fit (Hoyle, 1995). Higher GFI and AGFI values indicate a better fit of the model; however, no statistical test or critical value is available for these indices (Jöreskog & Sörbom, 1986).

2.3.6. *Correlations with strain, job stress and determinants of coping behaviour:* This aspect of the construct validity of the 4DSQ was investigated by calculating Pearson correlation coefficients of the 4DSQ scales with the UBOS Emotional exhaustion scale, the CIS scales, the Need for Recovery scale, the JCQ scales, the UCL scales, and the Mastery scale. To test the assumption that the correlations between these variables and Depression, Anxiety and Somatization were mediated by the correlations with Distress, we calculated partial (third order) correlation coefficients, in which case the correlations with the target 4DSQ scale was corrected for the influence of the remaining three 4DSQ scales (e.g. the partial correlation between 4DSQ Distress and UBOS Emotional exhaustion had been corrected for the variance shared with 4DSQ Depression, Anxiety and Somatization). If a significant zero-order correlation dropped to a non-significant third-order correlation, it can be inferred that the zero-order correlation was in fact mediated by the shared variance with the other variables.

3.   Results

3.1. *Descriptives*

Table 1 shows the mean scores (and standard deviations) of the 4DSQ scales for the total sample of employees. Furthermore, table 1 indicates that very little variance of the 4DSQ scores (no more than 1%) was accounted for by age, gender, education and job position. The distributions of the 4DSQ scores turned out to be rather asymmetric with skewness measures for Distress, Somatization, Depression, and Anxiety of 2.0, 1.8, 5.3, and 4.6, respectively. A 'normal' symmetric distribution has a skewness measure of zero; values exceeding 1 indicate a non–normal distribution. The positive skewness values of the 4DSQ scores indicate that a relatively large number of participants had (very) low scores, and only a few employees had high scores that indicate clinically significant symptoms. The percentages of employees with scores above the cut-off points on the 4DSQ scales were 11% and 7% for Distress (score > 10) and Somatization (score > 10), and 4% and 1% for Depression (score > 2) and Anxiety (score > 8). These figures illustrate the relatively good mental health in this sample of the working population. Approximately 10% of the employees experienced a certain amount of clinically significant distress, but clinical depression and anxiety disorders were rare.

3.2. *Reliability and inter-correlations*

Table 2 (first column) shows the Cronbach's α coefficients of the 4DSQ scales. The internal consistency of the 4DSQ scales was found to be good, since all values of α meet the criterion of .70 (Nunnally & Bernstein, 1994). Table 2 also shows the correlation matrix of the 4DSQ scales, from which it is apparent that there were substantial correlations between the four scales. The highest correlations were with Distress, which is in line with the assumption that distress increases the risk for psychiatric illness. Inspection of the scatter plots showed an interesting pattern in the associations between the Distress scores, on the one hand, and the Depression, Anxiety and Somatization scores, on the other hand. Employees with high scores for Depression, Anxiety or Somatization all had high scores for Distress, but the reverse was not true. Hence, it appeared that Distress was 'underlying' Depression, Anxiety and severe Somatization.

   We also investigated whether each of the 4DSQ scales covered a unique part of the spectrum of common psychological symptoms. Table 2 shows Cronbach's α values of the residuals of the items of each 4DSQ scale after all variance shared with the remaining three 4DSQ scales had been removed through multiple regression. From these α values, which were all well above .60, it is apparent that, despite the substantial inter-correlations between the scales, each of the 4DSQ scales did, indeed, cover a unique domain of psychopathology.

Table 1.   Mean scores (and standard deviations) of the 4DSQ scales of employees ($N = 3852$), and the variance of the 4DSQ scores explained by demographic variables; squared Pearson's coefficients R^2, and squared Eta coefficients η^2.

			Age	Gender	Education	Position
Scale	Range	Mean (SD)	R^2	η^2	η^2	η^2
Distress	0−32	4.2 (5.2)	.003	.006	.002	.008
Depression	0−12	0.4 (1.2)	.004	.000	.006	.005
Anxiety	0−24	0.7 (1.8)	.003	.005	.007	.012
Somatization	0−32	3.7 (4.1)	.005	.012	.008	.011

Table 2.   Reliability and inter-correlation of the 4DSQ scales ($N = 3852$), internal consistency (Cronbach's α) and Pearson's correlation coefficients r.

	α		r		
	Scale	Residuals	DIS	DEP	ANX
Distress	.90	.76			
Depression	.82	.72	.67		
Anxiety	.79	.65	.64	.57	
Somatization	.80	.69	.59	.39	.50

DIS = Distress; DEP = Depression; ANX = Anxiety.

3.3. *Factorial structure*

Table 3 shows the result of the exploratory factor analysis (EFA). The four factors that were labelled on the basis of the highest loading items (i.e. Depression, Distress, Somatization, and Anxiety), explained 39% of the variance. Forty-three items had factor loadings of $\geq .40$ on the factors corresponding with their scales. Two Somatization items had factor loadings of $< .40$ on the somatization factor (items 3 and 6). Three Anxiety items had factor loadings of $< .40$ on the anxiety factor (items 23, 44 and 50). Two Distress items had factor loadings of $< .40$ on the distress factor (items 31 and 36), but these items loaded high on the depression factor. Six items, one on the Anxiety scale (item 21) and five on the Distress scale (items 17, 22, 29, 32, and 37), had factor loadings of $\geq .40$ on two factors. A total of seven Distress items had factor loadings of $\geq .40$ on the depression factor. Evidently, there was a substantial overlap between the Distress and Depression scales.

Table 4 shows the results of the confirmatory factor analysis. The hypothesized 4-factor model fitted the data significantly better than the 1-factor model ($\Delta\chi^2 = 4582$; df $= 8$; $p < .001$). Since the correlation between the latent Distress factor and Depression factor was as high as .81, a 3-factor model was tested, in which Distress and Depression had been combined into one factor. It appeared that the fit of the 4-factor model was significantly superior to that of the 3-factor model ($\Delta\chi^2 = 835$; df $= 3$; $p < .001$). However, the 4-factor model did not match the fit indices, with the exception of the RMSEA. The Modification Indices suggested that the fit of the 4-factor model could be improved by allowing the error variance of 23 item pairs to correlate. These correlations were allowed only for item pairs belonging to the same scale, and only if such correlations were theoretically plausible. For example, the error variance of two items concerning sleeping problems was allowed to correlate. Indeed, this adjustment improved the model significantly ($\Delta\chi^2 = 4240$; df $= 25$; $p < .001$). Furthermore, item 3 ('fainting') was omitted because of its low factor loading (.21), whereas the remaining items had factor loadings exceeding .40, with the exception of two items, which had loadings between .30 and .40. Omitting item 3 further improved the fit of the 4-factor model ($\Delta\chi^2 = 307$; df $= 48$; $p < .001$), with the RMSEA meeting its criterion of .08, and the other goodness-of-fit indices approaching .90.

Finally, the Modification Indices suggested that six Distress items (items 17, 29, 31, 32, 36 and 37) should load on the Depression factor. Subsequently, these items were allowed to load simultaneously on the Distress and Depression factors. This final adjustment further improved the fit of the model to the data ($\Delta\chi^2 = 674$; df $= 7$; $p < .001$), the revised 4-factor model now meeting the criterion for the RMSEA, and marginally meeting the criteria for the TLI, NFI, and CFI. It was not possible to improve the model further.

Table 3. Four-Dimensional Symptom Questionnaire (4DSQ)[a]: Items, scales, frequencies of scores ($N = 3852$), and factor loadings from an exploratory factor analysis ($N = 1922$).

Item no. Item	Scale[b]	Frequencies (%)			Factor loadings			
		0	1	2[c]	Dep	Dis	Som	Anx[b]
During the past week, did you suffer from:								
1. Dizziness or feeling light-headed?	Som	80.4	15.2	4.3	.14	.26	**.44**	.13
2. Painful muscles?	Som	63.8	23.1	13.1	.01	.29	**.48**	−.03
3. Fainting?	Som	98.8	0.8	0.3	.10	−.10	.08	.23
4. Neck pain?	Som	71.6	17.2	11.2	.05	.25	**.49**	−.02
5. Back pain?	Som	63.7	22.8	13.4	.03	.24	**.44**	.01
6. Excessive perspiration?	Som	78.5	14.3	7.2	.04	.18	.37	.14
7. Palpitations?	Som	92.4	6.5	1.1	.17	−.00	**.48**	.15
8. Headache?	Som	64.0	26.7	9.3	.12	.33	**.44**	−.04
9. A bloated feeling in the abdomen?	Som	78.7	15.8	5.5	.10	.13	**.51**	.01
10. Blurred vision or spots in front of your eyes?	Som	81.2	14.7	4.2	.15	.25	**.44**	.06
11. Shortness of breath?	Som	92.5	5.9	1.6	.06	.04	**.45**	.29
12. Nausea or an upset stomach?	Som	87.2	9.5	3.3	.12	.11	**.47**	.15
13. Pain in the abdomen or stomach area?	Som	87.4	9.6	3.1	.13	.07	**.54**	.08
14. Tingling in the fingers?	Som	89.4	7.6	3.0	−.02	.06	**.42**	.17
15. Pressure or a tight feeling in the chest?	Som	89.6	8.6	1.8	.10	.02	**.60**	.23
16. Pain in the chest?	Som	93.4	5.5	1.1	.11	−.03	**.60**	.15
17. Feeling down or depressed?	Dis	82.2	14.3	3.5	**.40**	**.53**	.28	.15
18. Sudden shock for no reason?	Anx	93.5	5.4	1.1	.15	.21	.21	**.43**
19. Worry?	Dis	57.8	30.7	11.4	.18	**.65**	.27	.08
20. Disturbed sleep?	Dis	59.2	29.6	11.2	.07	**.64**	.24	.06
21. Indefinable feelings of fear?	Anx	88.1	9.1	2.8	.29	**.41**	.18	**.48**
22. Listlessness?	Dis	79.4	16.0	4.5	**.43**	**.52**	.22	.04
23. Trembling when with other people?	Anx	96.4	2.7	0.9	.15	.16	.13	.38
24. Anxiety or panic attacks?	Anx	96.4	2.7	0.9	.10	.09	.20	**.65**
During the past week, did you feel:								
25. Tense?	Dis	62.3	29.2	8.6	.23	**.63**	.26	.03
26. Easily irritated?	Dis	69.9	25.2	4.9	.21	**.56**	.21	.10
27. Frightened?	Anx	94.0	4.7	1.3	.25	.30	.13	**.62**
28. That everything is meaningless?	Dep	90.0	8.0	1.9	**.56**	.30	.06	.13
29. That you just can't do anything any more?	Dis	87.7	9.9	2.4	**.53**	**.43**	.14	.17
30. That life is not worthwhile?	Dep	96.2	2.9	0.9	**.75**	.11	.09	.23
31. That you can no longer take any interest in the people and things around you?	Dis	88.2	10.1	1.7	**.59**	.28	.15	.12

Table 3 (*Continued*)

Item no. Item	Scale[b]	Frequencies (%)			Factor loadings			
		0	1	2[c]	Dep	Dis	Som	Anx[b]
32. That you can't cope any more?	Dis	90.7	7.7	1.6	**.56**	**.41**	.12	.21
33. That you would be better off if you were dead?	Dep	98.0	1.7	0.3	**.71**	− .05	.08	.25
34. That you can't enjoy anything any more?	Dep	93.8	4.7	1.4	**.66**	.25	.16	.17
35. That there is no escape from your situation?	Dep	94.9	3.7	1.4	**.68**	.22	.12	.12
36. That you can't face it any more?	Dis	93.5	5.3	1.2	**.64**	.38	.15	.20
During the past week, did you:								
37. No longer feel like doing anything?	Dis	86.9	11.1	2.0	**.62**	**.41**	.19	.06
38. Have difficulty in thinking clearly?	Dis	81.1	16.3	2.6	.35	**.47**	.30	.06
39. Have difficulty in getting to sleep?	Dis	74.0	20.4	5.5	.07	**.58**	.22	.12
40. Have any fear of going out of the house alone?	Anx	99.0	0.6	0.4	.11	.00	.10	**.44**
During the past week:								
41. Did you easily become emotional?	Dis	78.2	18.1	3.6	.13	**.57**	.08	.18
42. Were you afraid of anything when there was really no need for you to be afraid? (for instance animals, heights, small rooms)	Anx	94.7	4.0	1.3	− .00	.19	.02	**.50**
43. Were you afraid to travel on buses, trains or trams?	Anx	98.4	1.2	0.4	.10	− .02	.05	**.51**
44. Were you afraid of becoming embarrassed when with other people?	Anx	88.9	9.9	1.1	.22	.33	.13	.26
45. Did you ever feel as if you were being threatened by unknown danger?	Anx	96.9	2.5	0.6	.20	.22	.06	**.59**
46. Did you ever think "If only I was dead"?	Dep	97.9	1.6	0.4	**.64**	− .11	.12	.27
47. Did you ever have fleeting images of any upsetting event(s) that you have experienced?	Dis	78.1	17.3	4.6	.14	**.49**	.03	.27
48. Did you ever have to do your best to put aside thoughts about any upsetting event(s)?	Dis	86.8	9.7	3.5	.15	**.52**	− .04	.32
49. Did you have to avoid certain places because they frightened you?	Anx	98.7	1.1	0.3	.10	.13	.09	**.52**
50. Did you have to repeat some actions a number of times before you could do something else?	Anx	94.4	4.6	0.9	.13	.26	.15	.26

[a] English version. Both the Dutch and English versions of the 4DSQ are available at http://www.emgo.nl/researchtools/4DSQ.asp or can be obtained from the first author.
[b] Dis = Distress, Dep = Depression, Anx = Anxiety, Som = Somatization.
[c] 0 = 'no', 1 = 'sometimes', 2 = 'regularly', 'often', or 'very often or constantly'.
Factor loadings are given in bold if ≥ .40.

Table 4. Results of the confirmatory factor analysis of the 4DSQ: goodness-of-fit indices χ^2, GFI, AGFI, TLI, NFI, CFI, RMSEA (see text). ($N = 1930$).

Model	χ^2	df	GFI	AGFI	TLI	NFI	CFI	RMSEA
1-factor	14522	1178	.71	.68	.60	.60	.71	.08
4-factor	9940	1170	.81	.79	.74	.73	.75	.06
3-factor[†]	10775	1173	.78	.76	.71	.70	.73	.07
4-factor[‡]	6535	1148	.87	.86	.84	.82	.85	.05
4-factor[‡,§]	6228	1100	.88	.86	.84	.83	.85	.05
4-factor[‡,§,¶]	5554	1093	.89	.88	.86	.85	.87	.05

df = degrees of freedom.
[†] Distress and Depression combined into one factor.
[‡] Correlations allowed between the error of 23 item pairs (only within the same factor).
[§] Item 3 omitted.
[¶] Six items allowed to load on the Distress and Depression factor.

3.4. *Correlations with strain, job stress and determinants of coping behaviour*

Table 5 shows the (partial) correlations between the 4DSQ scales and the UBOS Emotional exhaustion scale, the CIS scales, the Need for recovery scale, the JCQ scales, the UCL scales, and the Mastery scale. With respect to the strain measures, the 4DSQ Distress scale showed—as expected—the strongest correlations with Emotional exhaustion, Fatigue, Poor concentration, and Need for recovery (all $rs > .50$). The 4DSQ Depression and Anxiety scales had lower, but still substantial correlations with the comparison measures (rs ranging between .28 and .39). Yet, after removing the variance shared with the other 4DSQ scales, especially with the Distress scale, the (third-order) correlations dropped to non-significant and non-relevant values. This means that symptom clusters that were measured uniquely by the 4DSQ Depression and Anxiety scales did not correlate with the comparison measures. The zero-order correlations appeared to depend largely on the variance that Depression and Anxiety, and the comparison measures, shared with Distress. The 4DSQ Somatization scale took an intermediate position between Distress and Depression/Anxiety with respect to its correlations with fatigue-like measures (fatigue, exhaustion and need for recovery).

With respect to work stress and determinants of coping behaviour, our expectations, i.e. that there would be stronger correlations for the 4DSQ Distress scale than for the other 4DSQ scales, were confirmed in 6 out of 9 cases. For example, the 4DSQ Distress scale had the strongest correlation ($-.22$) with Social support, whereas the other 4DSQ scales had correlations ranging between $-.14$ and $-.16$. After controlling for the variance shared with the other 4DSQ scales, the picture became even more clear: distress continued to correlate with Social support ($r = -.12$), but the other 4DSQ scales no longer showed significant correlations. Three findings were not in accordance with our expectations: problem-focused coping style correlated with all four symptom dimensions to approximately the same extent, while the correlations were relatively small. Emotional coping style and Social coping style did not correlate to a significant or relevant extent with any of the four symptom dimensions of the 4DSQ.

4. Discussion

4.1. *Reliability of the 4DSQ scales*

Based on the values of Cronbach's α (Table 2), the internal consistency of the 4DSQ scales appears to be good. The internal consistency of the 4DSQ in the current working sample

Table 5. Correlations between the 4DSQ scales and indicators of strain, stressors, and determinants of coping behaviour: zero-order correlation coefficients r_0, partial third-order correlation coefficients $r_P^†$.

	N	Distress		Depression		Anxiety		Somatization	
		r_0	$r_P^‡$	r_0	$r_P^§$	r_0	$r_P^¶$	r_0	$r_P^{††}$
Indicators of strain									
Need for recovery	3852	**.56**	**.37**	**.33★**	−.06	**.35★**	−.04	**.45★**	**.19**
UBOS-Emotional exhaustion	2131	**.57**	**.37**	**.35★**	−.03	**.35★**	−.04	**.43★**	**.16**
CIS-Fatigue	361	**.53**	**.37**	**.30★**	−.05	**.28★**	−.11	**.42★**	.18
CIS-Poor concentration	361	**.53**	**.32**	**.39★**	.07	**.34★**	−.04	**.35★**	.06
Stressors									
JCQ-Psychological demands	3852	**.21**	**.17**	.08★	−.07	.10★	−.02	**.14★**	.03
Determinants of coping behaviour									
JCQ-Decision latitude	3852	**−.19**	−.07	**−.15★**	−.02	**−.16★**	−.04	**−.16★**	−.05
JCQ-Social support	3852	**−.22**	**−.12**	**−.16★**	−.02	**−.14★**	−.01	**−.15★**	−.02
UCL-Emotional coping style	3852	.10	.05	.08	.02	.05★	−.02	.09	.04
UCL-Avoidant coping style	3852	**.30**	**.14**	**.23★**	.03	**.25★**	.06	**.19★**	.01
UCL-Palliative coping style	3852	**.14**	.08	.08★	−.02	.09★	.01	**.11★**	.03
UCL-Problem-focused coping style	3852	**−.13**	−.03	**−.12**	−.02	**−.14**	−.07	**−.10★**	−.01
UCL-Social coping style	3852	−.01	.02	−.05	−.05	−.02	.00	−.01	−.00
Mastery	3852	**−.49**	**−.24**	**−.40★**	−.10	**−.37★**	−.04	**−.32★**	−.04

★ r_0 significantly different from the r_0 value in the Distress column (one-sided $p < .05$).
† Coefficients in bold print if $p < .001$ and $r > .10$.
‡ Controlling for Depression, Anxiety and Somatization.
§ Controlling for Distress, Anxiety and Somatization.
¶ Controlling for Distress, Depression and Somatization.
†† Controlling for Distress, Depression and Anxiety.
CIS = Checklist Individual Strength; JCQ = Job Content Questionnaire; UBOS = Utrecht Burnout Scale; UCL = Utrecht Coping List.

was slightly lower than in a sample of general practice patients (in which Cronbach's α ranged from .84 to .94 (Terluin, 1996)), which is probably due to a lower prevalence rate of psychological symptoms. Some Depression and Anxiety symptoms were found to have extremely low prevalence rates in the present study (Table 3).

4.2. *Inter-correlations between the 4DSQ scales*

The Pearson correlation coefficients (Table 2) indicate that the Distress scale shares 35–45% of its variance with the other 4DSQ scales. Nevertheless, even when all variance that is shared with the other 4DSQ scales is removed, sufficient internal consistency remains (as indicated by Cronbach's α of the residuals). This signifies that the Distress scale measures a unique aspect of the employee's symptomatology that is not covered by the other scales. The same is true for the Depression, Anxiety and Somatization scales. Thus, the 4DSQ scales do correlate with each other, but, at the same time, they also cover different unique aspects of the common psychological symptomatology that is observed in this working sample. Apart from that, the scatterplots indicated a special relationship between Distress, on the one hand, and Depression, Anxiety and severe Somatization, on the other hand. These plots suggested a hierarchical relationship between Distress and Depression/Anxiety/ Somatization. While elevated scores for Depression/Anxiety/Somatization are almost invariably combined with elevated Distress scores, the reverse is not true. Foulds (1976) has described this non-reciprocal relationship between 'higher' and 'lower' psychopathological states earlier in his 'hierarchical model of personal illness'.

4.3. *Factorial structure of the 4DSQ*

Although the 4-factor structure of the 4DSQ was largely confirmed, factor analysis showed that the 4DSQ does not contain four 'clean' dimensions. Instead, it seems that Distress and Depression overlap to a certain extent. Six items of the Distress scale were found to load on the depression factor as well. Yet, a 3-factor model, in which the Depression and Distress factors were combined into one factor, proved to be inferior to the 4-factor model (Table 4). The items that load on two factors are depressed mood (item 17), loss of interest (item 31), feelings of impotence (items 29 and 37), and demoralization (items 32 and 36). Although, in a non-clinical sample, most people with a depressed mood suffer from distress, and not from a depressive illness, depressed mood is considered to be one of the key symptoms of clinical depression (American Psychiatric Association, 1994). Likewise, loss of interest, representing the milder manifestation of anhedonia, is prevalent in many cases of 'nervous breakdown' (Terluin, 1994), but almost invariably present in depressive illness (American Psychiatric Association, 1994). Feelings of impotence and demoralization (i.e. failure to cope) are related to stress-related disorders in general, and to 'nervous breakdown' in particular (Dohrenwend *et al*., 1980; Frank, 1973; Pfeffer & Waldron, 1987; Terluin, 1994). However, the current study indicates that these phenomena are somehow also associated with depressive illness. Hence, we conclude that distress and depression may be conceptualized both as separate dimensions, and as the two ends of a continuum.

Conceptually, distress and depression can be considered to be distinct dimensions (section 1.2). In particular, if the cross-loading items are omitted this becomes quite obvious. There seems to be a 'pure' depression dimension, consisting of depressive thoughts and anhedonia (loss of pleasure), and a 'pure' distress dimension, consisting of milder symptoms such as worrying, feeling irritable and tense, and disturbed sleep. However, if we retain the cross-loading items, it becomes apparent that there is something 'in between'

distress and depression. Our results suggest that there is a fluent transition from distress to depression via feelings of impotence and demoralization, with 'pure' distress and 'pure' depression being the two ends of the continuum. Based on our clinical experience, and on our conceptual model of distress and depressive illness, we believe that this continuum reflects the development of depressive illness from distress in susceptible individuals. When we consider a person who is 'under stress' (i.e. under the influence of a stressor), we can expect that (s)he is experiencing some degree of distress. If the stressor is severe and/or the person's coping behaviour is unsuccessful, (s)he may develop severe distress, including feelings of impotence and demoralization (nervous breakdown), at which point (s)he has already developed some degree of depression (i.e. depressed mood and loss of interest). However, until (s)he develops substantial anhedonia and depressive cognitions, there is no depressive illness involved.

Technically speaking, one can argue that 'ambiguous' items—i.e. items that are loading on more than one factor—should be discarded. However, doing so in the case of the 4DSQ would result in omitting such theoretically and practically important symptoms as impotence and demoralization (Frank, 1973). For instance, Dohrenwend *et al.* (1980) considered demoralization to be a key element of the 'non-specific distress' dimension of common psychopathology. The findings of the present study suggest that distress and depression constitute not only separable dimensions, but also a continuum.

When two symptom clusters constitute one continuum, the boundary between these dimensions becomes arbitrary. Furthermore, factor analysis cannot tell us exactly which factor the cross-loading items 'really' belong to. The exact boundary between the distress and depression factors depends on the relative numbers of distress and depression items analysed. As yet, we consider demoralization and the other overlapping symptoms to pertain to the distress syndrome, i.e. the psychological consequences of strain.

Now that we have identified a continuum between distress and depression, would it not be easier to regard distress as the minor variant of depressive illness? The answer is no, because distress is not only related to depression, but also to anxiety and severe somatization. The only difference is that the 4DSQ does not contain any 'transitional' symptoms in between distress and anxiety, or in between distress and severe somatization. Although distress increases the risk for an anxiety disorder as well as for severe somatization, much in the same way as it increases the risk for a depressive illness, the transition between distress and anxiety disorder or severe somatization does not involve feelings of impotence and demoralization, as it does in the case of depressive illness. Apparently, other variables that are not included in the 4DSQ are also involved.

The overlap between the 4DSQ Distress and Depression scales might create difficulties for those who are trying to assess the associations of these constructs with other variables. Two methods can be used to unravel the relative contributions of Distress and Depression: the use of partial correlations and the use of multiple regression techniques. With these methods, it is possible to correct the contribution of distress for the contribution of depression, and vice versa. For example, Table 5 shows that an avoidant coping style is correlated with both Distress and Depression, but when Depression is corrected for Distress, the correlation with avoidant coping style disappears. In this case, some of the variance in the lower (less severe) range of the Depression scale that is associated with the Distress score, is taken out. When the Distress score and the Depression score are entered simultaneously in a regression analysis to predict any dependent variable, the overlapping variance of Distress and Depression is divided between these two predictors, resulting in Distress mainly representing pure distress, and Depression mainly representing the symptoms of clinical depressive illness.

4.4. *Correlations with strain, job stress and determinants of coping behaviour*

As expected, the strain measures—need for recovery, emotional exhaustion, fatigue, and poor concentration—correlated mainly with Distress and, after correction for Distress, not with Depression and Anxiety. The fatigue-like measures showed some residual correlation with Somatization (Table 5). This points to the fact that fatigue may constitute an important link between distress and somatization. Distressed persons, especially those who suffer from a 'nervous breakdown', often complain of persistent fatigue, causing them to abandon social roles, such as the work role. Debilitating fatigue is also a major complaint in burnout and chronic fatigue syndrome (Maslach *et al.*, 2001).

There was a mean interval of 45 days between the administration of the 4DSQ and the CIS. Assuming that there was no substantial change in either the 4DSQ or the CIS scores, the correlation coefficients represent valid estimates of the (dis)similarity between the scales. However, should one or more symptoms have been subject to change, the correlation coefficients could give an under-estimation if the relationship between distress and fatigue/poor concentration weakened over time, or they could give an over-estimation if distress led to fatigue and poor concentration over time.

Although not all of our expectations were confirmed, the overall picture is clear. Whenever job stress and coping-related measures correlate with psychological symptoms, they correlate mainly with Distress and, after correction for levels of Distress, not with Depression, Anxiety and Somatization. Overall, the correlation coefficients were rather small (except for mastery), which means that work stress and coping style explain only a small proportion of the variation in symptom scores in this sample of employees. However, most importantly with respect to the 4DSQ scales, we have been able to determine that the small association between work stress/coping styles and symptoms was mainly with Distress. This finding strongly supports our hypothesis that the 4DSQ Distress scale measures specifically the symptoms caused by the stress-coping process.

4.5. *Relevance of distress as a dimension of psychological symptoms*

Clark and Watson (1991) have reviewed the evidence for the existence of a 'general, non-specific distress' factor underlying anxiety and depression. They proposed the 'tripartite model' with the dimensions distress, anxiety and depression. Their distress dimension, which included symptoms such as irritability, poor concentration, insomnia, fatigue, and demoralization, is strikingly similar to the 4DSQ Distress dimension. We have come to believe that distress not only reflects the effort an individual has to put into coping with psychosocial—life—stress (e.g. work stress), but that distress also results from coping with other stressors such as psychiatric illness (e.g. clinical depression or anxiety disorder), or even physical disease. Whenever circumstances threaten a person's habitual psychosocial functioning, distress symptoms arise as the person is trying to keep his or her head above water. Distress indicates no more and no less than how hard a time someone is having, irrespective of the specific stressors involved. Although there is an abundance of questionnaires to measure psychological symptoms, most of them fail to distinguish between general distress and anxiety/depression. In fact, only two questionnaires do make such a distinction: the Mood and Anxiety Symptom Questionnaire (MASQ) (Keogh & Reidy, 2000; Watson *et al.*, 1995) and the Depression Anxiety Stress Scales (DASS) (Lovibond & Lovibond, 1995). However, these questionnaires use an approach that is different from ours with respect to the measurement of depression and, furthermore, they do not distinguish between anxiety and somatization (Bedford, 1997; Brown, Chorpita, Korotitsch, & Barlow, 1997).

4.6. *Limitations and strengths*

This study has some limitations. First of all, the cross-sectional design of the study should—strictly speaking—make us cautious about making causal inferences. However, the only causal relationship that we have inferred is the one between job stressors and psychological complaints, and this particular relationship has been studied extensively and is currently widely accepted (Quick & Tetrick, 2002). Second, our study is restricted to self-reported data, which carries the risk of inflating correlations by using the same measurement method. However, by using partial correlations we have shown that some correlations actually do not significantly differ from zero, and we have based our conclusions largely on the different correlational patterns of the Distress scale and the other 4DSQ scales. It is not likely that these different patterns can be ascribed to the common method of measurement. Third, the sample was exclusively restricted to employees of one specific company, and therefore can not be considered to be representative of the working population in general. Moreover, in this particular company, men outnumbered women by 9 to 1. Fourth, the response rate was only 51%, and the response was further affected by practical problems with the first mailing of the questionnaires. However, one of the strengths of this study is that data has been collected from several thousands of employees with various levels of education and various job positions. Although this specific study population may be subject to selection bias, it is unlikely that this has caused major deviations in the psychometric properties of the questionnaire under study. Nevertheless, our findings with regard to the reliability and validity of the 4DSQ cannot safely be extrapolated to entirely different populations, such as psychiatric patients.

Finally, this study offered only a limited opportunity to investigate the validity of the 4DSQ, since it only included stress-related measures, and no measures related to depression, anxiety or somatization. As for the validity of the 4DSQ Depression, Anxiety and Somatization scales, we have shown that these scales measure something different from general distress. For the time being, the face validity of the items should be considered. It seems difficult to imagine that the Depression items (e.g. loss of pleasure and suicidal ideation) could refer to anything else but clinical depression. A similar reasoning can be applied to the Anxiety and Somatization scales.

5.   Conclusion

This study has shown the 4DSQ to be a reliable self-report questionnaire in a working population. We have shown that the four scales—Distress, Depression, Anxiety and Somatization—measure different dimensions of the spectrum of common psychological symptoms. Furthermore, we have shown that Distress is associated with job stressors and indicators of strain. While distress was not particularly uncommon in our sample of working people, our data indicate that clinical depression and anxiety were rare conditions. Somatization took an intermediate position in this respect. When screening for psychological problems in an unselected population, we would recommend a two-stage approach. At first, it will suffice to administer only the Distress and Somatization scales, since low Distress scores exclude clinical depression and anxiety. Subsequently, the Depression and Anxiety scales can be administered, but only to people with elevated Distress scores (>10). In an occupational healthcare setting, when caring for employees who are on sick leave for psychological reasons, a physicain or nurse can administer the whole 4DSQ to assist in differentiating between purely stress-related conditions and psychiatric disorders.

   With respect to research, we hope that the 4DSQ may be helpful in facilitating communication between (work) stress researchers and psychiatric (epidemiological) researchers. In stress research, almost every psychological symptom is considered to be a consequence of stress, whereas in psychiatric (epidemiological) research almost all psychological symptoms are considered to arise from anxiety and depression. The 4DSQ provides an indication of which symptoms are stress-related, and which are due to psychiatric disorders.

6. Note

The 4DSQ is available in two language versions, the original Dutch version and an English version. This paper is based on the Dutch version of the 4DSQ. The English version is the result of a professional translation, followed by an independent re-translation into Dutch, and consensus discussion of discrepancies between the original text and the re-translated text. Both language versions are available at www.emgo.nl/researchtools/4dsq.asp or can be obtained from the first author.

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