

## Measuring Occupational Stress: Development of the Pressure Management Indicator

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The study of occupational stress is hindered by the lack of compact and comprehensive standardized measurement tools. The Pressure Management Indicator (PMI) is a 120-item self-report questionnaire developed from the Occupational Stress Indicator (OSI). The PMI is more reliable, more comprehensive, and shorter than the OSI. It provides an integrated measure of the major dimensions of occupational stress. The outcome scales measure job satisfaction, organizational satisfaction, organizational security, organizational commitment, anxiety–depression, resilience, worry, physical symptoms, and exhaustion. The stressor scales cover pressure from workload, relationships, career development, managerial responsibility, personal responsibility, home demands, and daily hassles. The moderator variables measure drive, impatience, control, decision latitude, and the coping strategies of problem focus, life work balance, and social support.

Stress at work is an increasingly common feature of modern life. A survey of 28,000 workers in 215 organizations in the United States linked stress at work to poor work performance, acute and chronic health problems, and employee burnout (Ivancevich, Matteson, Freedman, & Phillips, 1990; Kohler & Kamp, 1992). In the United Kingdom, researchers have estimated that 360 million working days are lost through sickness each year at an estimated cost of £8 billion (\$12.8 billion; Sigman, 1992). The U.K. Health and Safety Executive has estimated that at least half of these lost days are related to workplace stress (European Foundation for the Improvement of Living and Working Conditions, 1996). Individuals and their organizations face a growing problem of managing stress at work but are hampered by a lack of understanding of the nature of occupational stress.

Stress is an imprecise and misused term, and a system of measurement should provide a structure and a language that facilitates the understanding of

the subject. One of the major factors hindering research into occupational stress is the lack of consistency in the measurement tools. In an interesting comparison of different stress scales, Jick (1980) compared three stress scales taken from slightly different scaling schemes. Each of the scales was statistically reliable and conceptually plausible. However, the scales did not agree on the identification of high-stress individuals. Only 50% of the highly stressed individuals overlapped between any pair of measures. The absence of a reliable, valid, and usable standardized measuring instrument makes studies of occupational stress highly problematic (Love & Beehr, 1981). The need for a new questionnaire was prompted by our experience of empirical research using a collection of existing measures. These included questionnaires on mental health (e.g., Crown & Crisp, 1979), job satisfaction (e.g., Warr, Cook, & Wall, 1979), Type A behavior (e.g., Bortner, 1969), and locus of control (e.g., Rotter, 1966). We combined the questionnaires with organization-specific questions identifying sources of pressure and the use of coping mechanisms. This lack of standardization in approaches to measurement made cross-occupational and cross-company studies highly problematic. The solution was to develop a standardized measure covering all aspects of the stress–strain relationship—that is, stressors, moderating factors, and stress outcomes. This new questionnaire should be a reliable, valid, compact, and comprehensive diagnostic tool that can be used by all employees within and across organizations. The questionnaire should also help raise awareness of occupational

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Further information on the Pressure Management Indicator (PMI) and updated normative data are available on the Internet at [www.stressweb.com](http://www.stressweb.com). The PMI is available for noncommercial research on a permission-to-use agreement basis. We receive royalties and fee income from the sale of the Occupational Stress Indicator and PMI questionnaires to organizations.

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stress at the individual and organizational level, identify those individuals who need remedial help, and provide information for the design of appropriate interventions.

This article charts the development of this questionnaire, the Pressure Management Indicator (PMI; Williams & Cooper, 1996), and shows how it has evolved from the Occupational Stress Indicator (OSI; Cooper, Sloan, & Williams, 1988) into a standardized, reliable, compact, and comprehensive second-generation instrument.

### Development Process

Measurement provides a link between theoretical and empirical research. Measures need to provide information on both the theoretical constructs and on the relationships between these constructs (Jackson & Schuler, 1985). Dewe (1991) provided an excellent précis of the key issues. He believes that researchers should develop scale items that are (a) relevant (De Frank, 1988); (b) appropriate for the current rate of social and economic change (Brief & Atieh, 1987; Glowinkowski & Cooper, 1985); (c) worded carefully (Kasl, 1987; Tracy & Johnson, 1981); (d) able to balance positive, negative, and neutrally worded items (De Frank, 1988); (e) able to incorporate the temporal nature of the experience (Bailey & Bhagat, 1987); (f) able to estimate intensity and frequency (De Frank, 1988).

Dewe (1991) recognized that the focus on workplace stressors is no longer sufficient and that new approaches, consistent with the transactional view of stress (Shirom, 1988), need to be developed. To address the weaknesses in stress measurement, we started with a simple, pragmatic objective: to produce an instrument that would provide an integrated, comprehensive, relevant, and accurate measure of occupational stress.

The initial impetus for the development of the OSI was our frustration with the inability of existing instruments to provide a comprehensive, integrated assessment of occupational stress that could be used to provide practical help to individuals and their organizations (Cooper et al., 1988). The OSI was designed to measure the key components of the stress process identified through many years of empirical research using a variety of techniques such as questionnaires, interviews, and work study in a wide variety of organizations. The transactional model of stress on which the PMI and OSI questionnaires are based identifies three key elements of the stress

process—effects, sources, and individual differences—and places appraisal at the center of the process. It is not the demand or the source of pressure itself that is the issue, it is the *perception* of that pressure (Cox, 1978; Lazarus, 1966; McGrath, 1970). It follows that the perception of individual differences such as coping and support and the perception of stress outcomes such as well-being and job satisfaction should also be measured. Pratt and Barling (1988) stated that it is as important to measure the interpretation that individuals give to an event as it is to measure the event itself. The recognition that appraisal plays a key role in the stress process makes it appropriate to use self-report questionnaires to measure stress at work.

Stress is a complex, multivariate process. Diverse measures of occupational stress such as psychological health, anxiety, and job satisfaction are often used interchangeably (Newton, 1989). Hart, Wearing, and Headey (1993) extended this approach in what they described as a dynamic equilibrium theory of stress. This theory defines stress as a state of disequilibrium in the system of variables relating people to their environment that results in a change in people's normal levels of well-being. Hart and Wearing (1995) made the point that stress cannot be expressed as a single variable and that elements such as personality characteristics, coping processes, and positive and negative work experiences must also be considered.

The OSI-PMI questionnaires were therefore designed to measure a broad range of variables thought to be relevant to the stress process. Figure 1 shows how the PMI scales are categorized into the three core elements: stressors (sources of pressure), moderator variables (individual differences), and outcome variables (effects).

### *Development of the Original OSI*

We generated the item pool for the original questionnaires on the basis of structured interviews and a review of measurements of the underlying constructs. A battery of six questionnaires was developed to measure these elements of the stress process. The original item bank contained over 200 items scored on a 6-point Likert-type scale. One hundred fifty-six respondents completed the questionnaires (Cooper et al., 1988). The original sample consisted mainly of male middle and senior managers from a variety of organizations in the United Kingdom.

Most of the 28 scales in the final 167-item instrument were produced by factor analysis of the

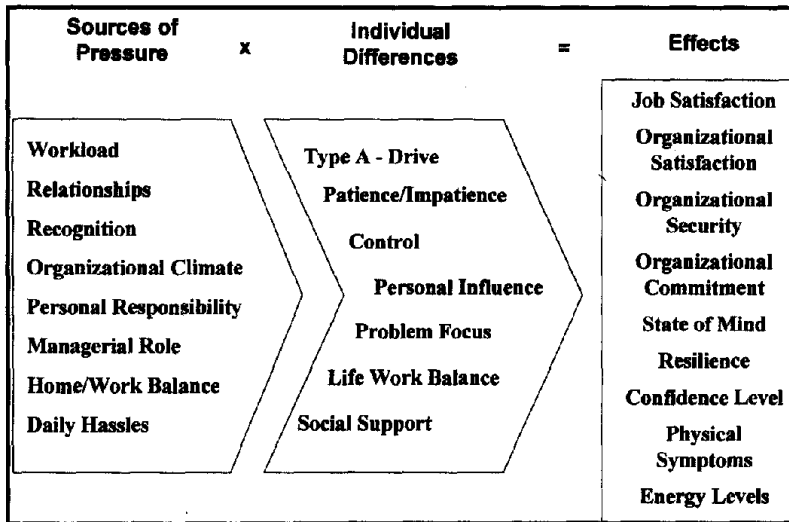


Figure 1. Categorization of the variables in the stress process.

original data; however, the ratio of items to participants was too small to enable this to be done for the Sources of Pressure Scales. These were produced by assigning the items to the six subscales found to describe stressors in previous research and based on the work of French, Caplan, and Harrison, (1982). The item content was used to identify the underlying construct for each scale, and this construct provided the explanation and description of the subscale and allowed it to be labeled. The scales are shown in Table 1 and described in detail in the OSI technical manual (Cooper et al., 1988 pp. 11-15).

#### Reliability of Original OSI

The original OSI suffered from being developed on the basis of a very small ( $N = 156$ ) sample. Although the OSI has been used extensively since its publication in 1988 and normative data are now available for over 20,000 people from a wide variety of organizations, the original scale structure remained. A number of studies reviewed the design and use of the questionnaire (see, e.g., Bogg & Cooper, 1995; Cooper & Bramwell, 1992; Cooper & Williams, 1991; Kahn & Cooper, 1990; Kirkcaldy, 1993; Rees & Cooper, 1992; Robertson, Cooper, & Williams, 1990; Sutherland, 1992). To test the psychometric properties of the OSI on a large diverse sample and see if the instrument could be improved, Williams (1996) analyzed the data from over 20,000 participants working in over 100 different organizations to evaluate the scale structure and reliability. The data

were collected between 1990 and the end of 1995 from a wide variety of organizations in the public and private sector in the United Kingdom. The data cleaning and verification left a sample of 14,455 individuals with no missing data and each participant having only completed one administration of the OSI.

The study reviewed the reliability of the subscales and the factor structure by using item analysis and confirmatory factor analysis. The results of these analyses were evaluated against criteria identified from the research literature. Table 1 (Williams & Cooper, 1997) shows the 28 scales of the Occupational Stress Indicator within the six-questionnaire structure of the instrument. The subscale coefficient alphas were calculated by using data from this large, diverse participant group ( $N = 14,455$ ).

The results of this analysis support the work of other researchers who have expressed concern about some of the scales of the original OSI (see Williams & Cooper, 1997, for a review of reliability and validity studies). The literature presents a consistent picture of strong scales measuring job satisfaction, mental and physical health, and sources of pressure (Cooper & Bramwell, 1992; Rees & Cooper, 1992; Robertson et al., 1990). However, the measure of Type A behavior appears to be problematic and requires further development; the Locus of Control and Coping Strategies scales are also flawed (Ingledew, Hardy, & Cooper, 1992; Kirkcaldy, Cooper, Eysenck, & Brown, 1994) and need to be improved or redesigned (Williams & Cooper, 1997).

Table 1  
*Occupational Stress Indicator Scale Reliability*

Scale domain and subscale label	No. of items	Coefficient $\alpha$
Job satisfaction		
Achievement--value and growth	6	0.84
Job itself	4	0.64
Organizational design and structure	5	0.74
Organizational processes	4	0.73
Personal relationships	3	0.54
Total job satisfaction	22	0.92
Health		
Mental health	18	0.88
Physical health	12	0.85
Type A behavior		
Attitude to living	6	0.42
Style of behavior	5	0.64
Ambition	3	0.41
Total Type A	14	0.70
Locus of control		
Organizational forces	5	0.53
Management processes	4	0.10
Individual influences	3	0.40
Total locus of control	12	0.61
Sources of pressure		
Factors intrinsic to the job	9	0.70
Managerial role	11	0.80
Relationships with other people	10	0.78
Career and achievement	9	0.78
Organizational structure and climate	11	0.83
Home--work interface	11	0.84
Coping strategies		
Social support	4	0.51
Task strategies	7	0.44
Logic	3	0.42
Home--work relationships	4	0.57
Effective use of time	4	0.03
Involvement	6	0.42

### *Conclusions From the Reliability and Item Analysis*

With personality tests, reliabilities of greater than 0.7 are expected (Rust & Golombok, 1989). In reviewing the OSI we set a predetermined target level of acceptable reliability of  $\alpha = 0.8$  or above for the full scale and  $\alpha = 0.7$  and above for the subscales. The Job Satisfaction and Mental and Physical Health Scales worked well and met the reliability targets. With the exception of the the Job Itself and Personal Relationships subscales, all Job Satisfaction Scale subscales also met the target reliability level.

Factor analysis showed that the Mental and Physical Health Scales did not appear to be unitary and that their underlying factor structure should be explored. The Sources of Pressure Scale was particularly strong, and all of its subscales exceed the target reliability level. However, the original scales were not produced by factor analysis (Cooper et al., 1988), and exploratory factor analysis of this large data set suggested that alternative factor structures might provide a better fit to the data.

### *Development of the PMI*

To overcome the limitations of the original OSI and to meet the requirements of organizational users, we embarked on an extensive development program to improve the questionnaire. Users had commented that the use of the word *stress* in the title of the questionnaire presupposed that there was a stress problem in their organization. Respondents also felt that if people were asked to complete a stress questionnaire they would report more stress than if a more neutral word was used. It was therefore decided to put the emphasis on *pressure*, the neutral side of the equation, rather than *stress*, the negative consequences of pressure (Williams, 1994). The revised OSI was therefore renamed as the PMI and published in 1996 (Williams & Cooper, 1996).

Research identified several issues that needed to be addressed in the development process.

#### *The PMI Should Be Quick to Complete and Nonthreatening*

The original OSI took between 30 and 45 min to complete. A number of organizations felt that response rates were being affected by the length of the questionnaire and asked for a shorter version. They also felt that some of the items were too long and, in some cases, ambiguous or too complex. The weakness in some of the items were confirmed by an analysis of item-distribution characteristics (Williams, 1996); those items not showing a normal distribution were removed.

#### *The PMI Must Achieve a Balance Between Utility and Power*

There is a conflict in questionnaire design between the use of a large number of items to generate a high coefficient alpha and limiting the scales to the smallest number of items to maximize usability. With this principle in mind, we decided when designing the

revised questionnaire to reduce the number of items so as to shorten and simplify the questionnaire without sacrificing its psychometric properties. For example, removing two items from the Personal Responsibility Scale slightly reduced its reliability from  $\alpha = .78$  to  $\alpha = .76$  (Williams, 1996).

### *The PMI Should Be Able to Be Used by Everyone in an Organization*

There are few examples in the literature of studies of occupational stress that involve everyone in an organization. Our research experience has shown that enormous benefits arise when everyone in an organization takes part in a stress audit. Many people in industry still see stress as a white-collar or executive phenomenon, and the stress experienced by blue-collar and other lower level employees tends to be ignored. In developing the PMI we took care to simplify the items and reduce the reading level to make the questionnaire acceptable to all employees.

### *The PMI Should Be Used in Different Occupational Settings*

It can be dangerous to generalize. An instrument that works in one occupational setting or for one particular group of individuals may not work for others. If it is to be a standardized instrument, the PMI needs to work across occupational groups and must be able to provide meaningful comparisons among these groups. The use of an extremely diverse data set representing over 100 different organizations from the public and private sectors reduces the possibility of industry sector or organizational bias.

### *The PMI Should Work Across Cultural Boundaries*

Many of the multinational organizations that use the OSI want to investigate stress at work across national boundaries. Even within the geographic boundaries of a country, the diversity of ethnic groups makes it important to use an instrument that is as culture free as possible. Several of the organizations involved in the development of the PMI employed a large proportion of ethnic minorities, and some items that caused problems for people with English as a second language were identified and removed.

### *The PMI Should Identify Organization-Specific Issues and Reflect Changing Demands on Workers*

The diversity of work environments means that issues need to be measured that are too specific to be included in the core instrument. These might include job-specific demands, specific climate measures, or additional questionnaires designed to measure variables such as work environment in more depth. The world of work is constantly changing, and the questionnaire needs to reflect changes in demands such as job insecurity and technology changes.

### *Participants*

The basis for this development was the very large data set of 14,455 participants who had completed the original OSI (Williams, 1996). To test the robustness of the revised OSI structure, we collected additional data from four independent sources to test the reliabilities of the new scales on different groups of participants from the sample used in the development. The first of these additional data sets represented a managerial population. This consisted of data from managers ( $n = 465$ ) working for a large multinational company in the manufacturing industry. The second data set provided a within-company sample of employees ( $n = 3,041$ ) working in a large company in the communications industry. These employees worked at all levels in the organization, with the majority in nonmanagerial roles. The third data set consisted of a small sample of people ( $n = 90$ ) attending a psychiatric outpatient clinic. These respondents completed the Mental Health, Physical Health, and Coping Scales of the OSI. Finally, the new PMI questionnaire, including the additional items, was tested on a large and diverse group of people ( $n = 4,946$ ) working in a wide variety of jobs in private- and public-sector organizations in the United Kingdom. The development process used completed questionnaires from 22,997 people.

### *Development Method*

The PMI was developed in two stages. The first stage involved improving the psychometric properties of the OSI through an iterative process involving exploratory factor analysis, item analysis, and confirmatory factor analysis. In the second stage, we supplemented the items retained from the original OSI with additional items designed to strengthen the weaker scales and produce additional scales. Our

experience conducting a large number of focus groups as part of the stress audit process helped us identify the need for additional scales to measure constructs not covered by the original instrument (such as organizational commitment, job security, and decision latitude). These focus group discussions, involving several hundred people from a wide variety of organizations, helped us generate the item pool for the additional 50 questions.

### *Stage 1—Refining the OSI*

The first stage of the development process involved the following steps.

Every item in the scale was evaluated by using item analysis to identify those items with low item total correlations and to provide a baseline measure of overall scale reliability. Second, we examined the correlation matrix for the full scale to identify possible structure. We analyzed these data by using principal-components factor analysis to explore possible structures. The factor loadings were examined and, depending on the results of the factor analysis, further exploratory analysis was carried out constraining the solution to a specified number of factors. We then assessed the reliability of the factorial structure produced by the exploratory analysis using item analysis on each factor and on the

overall scale. After making any further adjustments, we tested the model by using confirmatory factor analysis. Parameter estimates were examined and adjustments were made to the structure. We again tested the reliability of the factors by using the revised items. If the reliability statistics were unsatisfactory, we restarted the iterative process using alternative exploratory structures. We carried out a further confirmatory factor analysis on the final version of the scale, then examined parameter estimates and goodness-of-fit statistics. Where necessary, we made further adjustments to the scale structure.

After completing the principal-components factor analysis and confirmatory factor analysis, we recalculated the reliability of the final proposed structure for the revised OSI. If this produced a satisfactory result, the development cycle stopped. If the result was unsatisfactory, we repeated the process using different structures.

### *Stage 2—Development of Additional Scales*

Using a combination of item and factor analysis as described in the previous section, we analyzed data from the 4,946 respondents who completed the new PMI questionnaire to produce a final scale structure (see Table 2). Table 2 shows the additional four scales developed from the extra items.

Table 2  
*Pressure Management Indicator Scale Reliability*

Subscale	No. of items	<i>M</i>	<i>SD</i>	$\alpha$
Job Satisfaction	6	22.60	5.39	0.89
Organization Satisfaction	6	19.34	4.65	0.83
Organizational Security	5	16.08	3.96	0.77
Organizational Commitment	5	18.80	3.81	0.75
State of Mind	5	20.41	5.35	0.82
Resilience	4	17.47	3.63	0.70
Confidence Level	3	10.41	3.45	0.70
Physical Symptoms	3	14.81	3.08	0.72
Energy Levels	4	14.67	4.49	0.79
Workload	6	17.30	6.13	0.84
Relationships	8	25.84	7.34	0.88
Recognition	4	12.92	4.56	0.85
Organization Climate	4	13.45	3.74	0.78
Personal Responsibility	4	12.17	3.52	0.79
Managerial Role	4	9.16	3.97	0.73
Home-Work Balance	6	13.56	5.64	0.83
Daily Hassles	4	11.34	3.13	0.64
Type A Drive	5	15.48	3.13	0.72
Patience-Impatience	5	18.49	3.44	0.80
Control	5	11.70	2.20	0.72
Personal Influence	3	16.64	3.16	0.71
Problem Focus	6	16.99	3.26	0.80
Life-Work Balance	4	10.81	2.46	0.73
Social Support	3	10.66	2.96	0.80

Table 3  
*Pressure Management Indicator Outcome Variables Scale Correlations*

Subscale	1	2	3	4	5	6	7	8	9
1. Job Satisfaction	—								
2. Organization Satisfaction	.61	—							
3. Organizational Security	.38	.52	—						
4. Organizational Commitment	.72	.53	.40	—					
5. State of Mind	.33	.31	.33	.35	—				
6. Resilience	.35	.27	.28	.38	.65	—			
7. Confidence Level	.11	.11	.20	.12	.60	.43	—		
8. Physical Symptoms	.20	.20	.20	.19	.45	.33	.26	—	
9. Energy Levels	.33	.31	.29	.33	.62	.47	.40	.52	—

Note.  $N = 8,503$ . All correlations are significant at  $p < .05$ .

*Results.* The first stage of the development process reduced the original 167 items from the OSI to a 90-item questionnaire with 22 subscales. Job satisfaction was measured as satisfaction from the job itself and from organization climate. The Mental and Physical Health subscales are State of Mind (measuring anxiety–depression), Resilience, Confidence Level (measuring worry), Physical Symptoms, and Energy Levels (measuring exhaustion). Pressure is measured on eight factors: Workload, Relationships, Home–Work Balance, Managerial Role, Personal Responsibility, Daily Hassles, Recognition, and Organizational Climate. Individual Differences are measured as two aspects of Type A behavior (impatience and drive) and two aspects of Locus of Control (personal influence and control). The Coping scales report the use of problem focus strategies and life–work balance. We identified social support as a separate construct. The robustness of the revised OSI was then tested by item and confirmatory factor analysis with data from the 465 managers and then with the separate group of 3,041 employees. We

tested the Mental Health, Physical Health, and Coping Scales with the data from 90 psychiatric outpatients.

*PMI scale reliabilities.* Table 2 summarizes the reliabilities of the PMI scales ( $N = 4,946$ ). The results show that, with the exception of Daily Hassles ( $\alpha = .64$ ), all of the scales met or exceeded the target reliability level. Further analysis of the data using confirmatory factor analysis showed that the PMI is a significant improvement on the original OSI (Williams, 1996).

*PMI scale correlations.* Tables 3–6 show the correlation matrixes for each of the subscales within the three dimensions measured by the PMI. Table 3 shows that all the outcome measures are positively correlated and that the “morale” measures of job and organizational satisfaction, organizational commitment, and security were more highly correlated with each other than with the variables measuring mental and physical well-being. Table 4 shows the relationship between the various sources of pressure measured by the PMI. All the scales were positively correlated with the weakest interscale correlation for

Table 4  
*Pressure Management Indicator Stressor Variables Scale Correlations*

Subscale	1	2	3	4	5	6	7	8
1. Workload	—							
2. Relationships	.44	—						
3. Recognition	.23	.58	—					
4. Organization Climate	.48	.62	.49	—				
5. Personal Responsibility	.53	.43	.22	.52	—			
6. Managerial Role	.56	.27	.15	.31	.50	—		
7. Home–Work Balance	.59	.34	.25	.32	.41	.42	—	
8. Daily Hassles	.56	.49	.23	.51	.58	.46	.43	—

Note.  $N = 8,503$ . All correlations are significant at  $p < .05$ .

Table 5  
*Pressure Management Indicator Moderator Variables Scale Correlations*

Subscale	1	2	3	4	5	6	7
1. Type A Drive	—						
2. Patience-Impatience	.23	—					
3. Personal Influence	.22	.07	—				
4. Control	.23	-.08	.39	—			
5. Problem Focus	.24	.03	.25	.17	—		
6. Life-Work Balance	-.03	-.13	.04	.02†	.28	—	
7. Social Support	.07	.01†	.07	.04	.39	.17	—

† Not significant.

managerial role with the scale measuring career and achievement. The relationships between the Type A, Control, and Coping Scales shown in Table 5 are much weaker than the scale intercorrelations of the other groups of variables.

Table 6 shows the relationships between each of the effects variables and the other PMI scales. The correlation matrix shows that high levels of satisfaction, commitment, security, and mental and physical well-being were negatively correlated with high pressure and the impatience dimension of Type A behavior. The effects variables were positively correlated with increased control and influence, the drive dimension of Type A, and greater use of coping strategies. (Table 7 provides a brief description of the PMI scales and shows how to interpret high or low scores.)

#### *Studies That Have Used the PMI*

As the PMI is a new instrument, it is not yet possible to provide a detailed list of research publications. However, the PMI is already being used in many research projects and further publications are expected in the near future. For example, the PMI is being used together with the Work Locus of Control Scale (Spector, 1988) and Hofstede's Work Related Values questionnaire (Hofstede, 1980) in a major comparative international study of stress at work.<sup>1</sup> The findings from this study will be used to increase understanding of managerial stress across countries and will be reported in due course.

In the United Kingdom, researchers are using the PMI in a large-scale study investigating stress among the professions. Eight-thousand questionnaires have been distributed to members of professional groups, including accountants, lawyers, solicitors, junior doctors, consultants, general practitioners, dentists, and management consultants. This study should enable researchers to make a detailed comparison of professional stress and help the understanding of the relationship among factors such as perceived de-

mands, working hours, control, coping and support, and the effects of stress.

In the absence of detailed research studies, the following examples are included as a brief introduction to the way the PMI has been used to investigate stress at work. Results from these cases provide some evidence of the predictive validity of the scale structure.

*Investigation into leavers.* Nearly 2,000 ( $N = 1,952$ ) employees of a large telecommunications company completed the computerized version of the PMI in September 1996 as part of an annual health audit. Each participant's employee staff number was used to link the results of the audit with each individual's employment status as of June 1997. The analysis showed that 161 of the respondents (8%) had left the company since completing the questionnaire. Table 8 shows the differences in the PMI scale scores for those continuing in employment ( $n = 1,791$ ) and the leavers ( $n = 161$ ). Significant differences are highlighted in the table.

The table also shows that leavers had much less organizational commitment and lower job satisfaction. They reported much more pressure from relationships at work, lacked recognition, and had less personal discretion and influence. The company's human resources professionals recognized these as characteristics of the leavers.

*Gender differences.* We explored the effect of gender on the stress process by using data from a stress audit conducted with the head office staff of a large government department. To avoid the confounding influences of grade and job type, we included female ( $n = 213$ ) and male ( $n = 200$ ) clerical staff

<sup>1</sup> Countries involved in the international study of stress in the workplace are Australia, Belgium, Bulgaria, Canada, China, England, Estonia, Germany, Hungary, India, Iran, Ireland, Israel, Italy, Japan, Mexico, the Netherlands, New Zealand, Poland, Portugal, Romania, Slovenia, South Africa, Spain, Sweden, Taiwan, Ukraine, and the United States.

Table 6  
*The Relationship Between the Outcome Variables and the Other Pressure Management Indicator Scales*

Subscale	Job Satisfaction	Organization Satisfaction	Organizational Security	Organizational Commitment	State of Mind	Resilience	Confidence Level	Physical Symptoms	Energy Levels
Workload	-.01†	-.15	-.12	-.05	-.35	-.26	-.25	-.21	-.29
Relationships	-.42	-.52	-.32	-.32	-.38	-.30	-.21	-.27	-.34
Recognition	-.41	-.32	-.26	-.23	-.17	-.12	-.05	-.17	-.21
Organization Climate	-.33	-.52	-.47	-.34	-.38	-.30	-.20	-.24	-.33
Personal Responsibility	-.04	-.14	-.18	-.07	-.35	-.29	-.33	-.17	-.23
Managerial Role	.11	.01†	.01†	.08	-.10	-.07	-.06	-.06	-.04
Home-Work Balance	-.04	-.04	-.08	-.01†	-.25	-.25	-.17	-.20	-.22
Daily Hassles	-.11	-.20	-.23	-.13	-.38	-.31	-.27	-.23	-.28
Type A Drive	.13	.09	.18	.21	.15	.23	.11	.05	.09
Patience-Impatience	-.05	-.09	-.08	.00†	-.27	-.11	-.22	-.16	-.23
Personal Influence	.52	.34	.29	.53	.22	.28	.11	.15	.21
Control	.43	.45	.47	.41	.32	.24	.16	.20	.29
Problem Focus	.17	.06	.11	.21	.22	.32	.14	.11	.14
Life-Work Balance	.04	.05	.06	.07	.33	.34	.33	.22	.27
Social Support	.06	.05	.03	.07	-.04	.07	-.09	-.03	-.06

Note.  $N = 8,503$ . Unless otherwise marked, all correlations are significant at  $p < .05$ .

† Not significant.

doing similar jobs within the same department in our analysis. The results show that women tend to report more worry than men, report less energy, make more use of time management, and make much more use of social support (see Table 9).

*Organizational measures.* To measure the extent to which the PMI is able to differentiate between stable and unstable organizations, we collected data from employees in part of an organization that was in the process of being sold (the unstable company;  $n = 68$ ). We then compared these data with data from a long established, successful "blue chip" company (the stable company;  $n = 35$ ). To avoid the confounding influence of gender, only male employees were included in this analysis. The results (see Table 10) show massive differences in the measure of organizational security, with the stable company employees reporting twice as much security ( $M = 19.83$ ) as the employees in the unstable company ( $M = 9.74$ ). The unstable company employees reported lower levels of organizational commitment and much lower job satisfaction, particularly with the organization. They had less energy, were under more pressure from the organization climate, and had much less influence. As in the previous example, these differences are as expected.

*Differences in level of seniority.* Our experience conducting stress audits with employees at all levels in an organization has shown that level of seniority or grade is an important factor in occupational stress. Table 11 shows the results of a comparison between administrative-grade staff ( $n = 139$ ) and managers ( $n = 95$ ) working for the same public-sector department. Managers demonstrated much more commitment to the organization and reported more satisfaction from the job itself. They reported much more pressure from the workload and, as expected, the managerial role. Again, as expected, they reported less pressure from career and achievement. They reported having more drive, more influence, and more discretion in their jobs. The managers made greater use of problem-focused coping techniques.

*Psychiatric outpatients.* To test the ability of the revised PMI to differentiate between normal stress levels and illness, we collected OSI data from a group of people in work and attending a psychiatric outpatient clinic ( $n = 90$ ) and compared it with data from the working population ( $n = 2,859$ ). To enable the comparison to be made, we recalculated the mental health items from the OSI to produce the PMI Mental Health Scales.

The results presented in Table 12 show that there are highly significant differences ( $p < .0001$ ) be-

tween the psychiatric outpatients and the population means with outpatients, as expected, reporting much lower levels of mental health on every scale.

### Using the PMI

Since its publication in 1996, the PMI has been used in a variety of primary, secondary, and tertiary health care interventions. The questionnaire is available in paper, computer disk, E-mail, and Intranet formats and all responses are computer scored. The results are analyzed to produce detailed aggregate reports benchmarking the organization against the working population, industry sector, and occupational group normative data. Within an organization, results for various work groups are compared to prioritize interventions and model better practices. Although these internal comparisons vary according to the organization, they usually include comparisons by location, division, grade, gender, job type, age, and length of service. In most organizations everyone who completes the PMI receives a detailed individual report on their responses to the questionnaire. This report, the PMI Personal Profile, is a 12-page, narrative, computer-generated assessment. The combination of a detailed aggregate report for the organization and personal profiles for each employee encourages a variety of group and individual interventions.

The PMI has been used to identify specific stressors and to enable organizations to reduce or eliminate these stressors at their source. For example, an international pharmaceutical company identified some process issues as major stressors and reengineered the system to remove the problem. Secondary intervention has been achieved by using the questionnaire to provide information on how individuals or groups are managing the stress process and designing training or education programs to increase awareness of the issues and improve their stress management skills. For example, a leading British retailer recognized that increased business pressures such as extended hours and staffing-level changes would increase the demands on its employees. To prepare staff to manage the expected increase in pressure, the company designed an in-house training program for its employees based on the issues identified by the PMI.

Tertiary prevention includes helping individuals who are suffering from workplace stress to benefit from early detection and remedial treatment. At the

**Table 7**  
*Interpreting the Pressure Management Indicator (PMI)*

PMI scale	Meaning	Low score	High score
Organizational Security	How secure someone feels about the stability of his or her organization and level of job security.	Very insecure	Very secure
Organizational Commitment	How committed a person is to his or her organization and the extent to which he or she feels that work improves the quality of life.	Not committed to the organization	Very committed to the organization
Job Satisfaction	How satisfied someone feels about the type of work he or she is involved in, in terms of tasks and functions.	Little satisfaction from the job	A lot of satisfaction from the job
Organization Satisfaction	How satisfied someone feels about the way an organization is structured and the way it works.	Little satisfaction from the organization	A lot of satisfaction from the organization
State of Mind	How satisfied an individual feels about his or her state of mind.	Feels anxious	Feels content
Resilience	The ability to "bounce back" from setbacks or problems.	Poor at "bouncing back"	Good at "bouncing back"
Confidence Level	The extent to which someone feels settled or worried.	Feels worried	Feels settled
Physical Symptoms	How calm a person feels in terms of physical tension or other uncomfortable sensations.	Some feeling of physical discomfort	Feels calm
Behavioral Symptoms	The amount of energy and vitality someone has before he or she feels tired and worn out.	Less energy and feels more tired	More energy and feels less tired
Workload	The amount or difficulty of work one must deal with.	Less pressure	More pressure
Relationships	How well one gets along with the people around them, particularly those at work.	Less pressure	More pressure
Recognition	The extent to which people feel they need to have their achievements recognized.	Less pressure	More pressure
Organization Climate	The "feel" or "atmosphere" within the place of work.	Less pressure	More pressure
Personal Responsibility	Taking responsibility for one's actions and decisions.	Less pressure	More pressure
Managerial Role	Being responsible for managing and supervising other people.	Less pressure	More pressure
Home-Work Balance	"Switching off" from the pressure of work when at home, and vice versa.	Less pressure	More pressure
Daily Hassles	The day-to-day irritants and aggravations in the workplace.	Less pressure	More pressure
Drive	The desire to succeed and achieve results.	Less drive	More drive
Patience-Impatience	A person's pace of life and ability to cope with his or her need for urgency.	More patient	More impatient

Table 7  
(continued)

PMI scale	Meaning	Low score	High score
Personal Influence	The extent to which someone is able to exercise discretion in his or her job.	Not much influence and discretion	More influence and discretion
Control	How much one feels able to influence and control events.	Not much influence and control	More influence and control
Problem Focus	The extent to which one plans ahead and manages his or her time to deal with problems.	Less use of problem focusing	More use of problem focusing
Life-Work Balance	The extent to which a person is able to separate home from work and not let things get to him or her.	Less use of life-work balance	More use of life-work balance
Social Support	The help one gets by discussing problems or situations with other people.	Less use of social support	More use of social support

treatment level, the PMI personal profiles have been used to give individuals a detailed assessment of their stress profile. These profiles provide a structure for understanding occupational stress and may be used to provide a framework for counseling. The PMI personal profiles also act as a prompt and encourage people at risk to seek appropriate counseling or other

treatment. For example, a large organization using the PMI as part of an annual medical screening program was able to help a number of individuals avoid serious breakdown by detecting early signs of stress.

One of the major problems for practitioners in the field of occupational stress is the lack of standardization, not only in the meaning and the use of the word

Table 8  
*Differences in Pressure Management Indicator Scale Scores: Leavers and Current Employees*

Subscale	Employee <i>M</i>	Leaver <i>M</i>	<i>p</i>
Organizational Security	16.33	15.86	.088
Organizational Commitment	19.19	17.40	.000
Job Satisfaction	23.01	19.34	.000
Organization Satisfaction	20.25	18.35	.000
State of Mind	21.13	20.70	.322
Confidence Level	10.76	10.66	.715
Resilience	18.10	17.98	.683
Physical Symptoms	14.82	14.65	.480
Energy Levels	15.16	14.37	.029
Workload	16.84	17.33	.295
Relationships	25.60	28.30	.000
Recognition	13.02	14.84	.000
Organization Climate	13.12	13.60	.092
Personal Responsibility	12.04	11.91	.617
Managerial Role	9.26	9.10	.607
Home-Work Balance	13.85	14.72	.053
Daily Hassles	11.27	10.82	.067
Type A Drive	15.47	16.08	.015
Patience-Impatience	18.39	18.40	.976
Personal Influence	11.76	10.88	.000
Control	16.88	16.11	.002
Problem Focus	24.43	24.37	.852
Life-Work Balance	17.24	17.37	.599
Social Support	11.04	11.17	.497

Table 9  
*Differences in Pressure Management Indicator Scale Scores by Gender*

Subscale	Female <i>M</i>	Male <i>M</i>	<i>p</i>
Organizational Security	15.53	14.78	.053
Organizational Commitment	17.54	16.98	.127
Job Satisfaction	21.05	20.97	.872
Organization Satisfaction	18.09	18.68	.192
State of Mind	19.20	20.03	.095
Resilience	15.98	16.04	.875
Confidence Level	9.42	10.43	.002
Physical Symptoms	14.67	14.52	.631
Energy Levels	13.15	14.41	.004
Workload	17.19	17.26	.902
Relationships	26.40	26.30	.898
Recognition	14.14	14.96	.078
Organization Climate	14.24	14.05	.575
Personal Responsibility	12.51	12.27	.470
Managerial Role	8.91	9.09	.623
Work-Home Balance	13.57	13.29	.640
Daily Hassles	11.25	11.34	.766
Patience-Impatience	18.27	18.19	.803
Personal Influence	10.37	10.70	.121
Type A Drive	15.18	14.69	.098
Control	15.94	15.89	.883
Life-Work Balance	16.92	17.49	.075
Problem Focus	24.81	23.88	.007
Social Support	11.44	9.77	.000

Table 10  
*Differences in Pressure Management Indicator Scale Scores: Unstable and Stable Company*

Subscale	Unstable company <i>M</i>	Stable company <i>M</i>	<i>p</i>
Organizational Security	9.74	19.83	.000
Organizational Commitment	18.02	20.74	.001
Job Satisfaction	21.16	23.74	.015
Organization Satisfaction	14.68	20.69	.000
State of Mind	18.84	20.51	.126
Resilience	16.46	17.74	.104
Confidence Level	10.28	10.17	.862
Physical Symptoms	14.38	14.77	.586
Energy Levels	13.63	15.74	.029
Workload	20.10	17.69	.099
Relationships	29.27	27.66	.297
Recognition	14.65	12.57	.032
Organization Climate	16.96	12.69	.000
Personal Responsibility	13.34	11.80	.079
Managerial Role	9.34	9.17	.831
Home-Work Balance	15.41	13.03	.083
Daily Hassles	11.90	10.69	.097
Type A Drive	15.16	16.11	.201
Patience-Impatience	18.93	18.94	.984
Personal Influence	11.75	12.06	.495
Control	14.82	17.89	.000
Life-Work Balance	16.02	17.37	.076
Problem Focus	23.90	24.31	.674
Social Support	10.18	10.37	.725

Table 11  
*Differences in Pressure Management Indicator Scale Scores by Grade of Work*

Subscale	Administrative <i>M</i>	Management <i>M</i>	<i>p</i>
Organizational Security	16.22	16.39	.712
Organizational Commitment	17.88	19.46	.002
Job Satisfaction	21.27	24.80	.000
Organization Satisfaction	19.81	19.52	.637
State of Mind	20.32	19.87	.534
Resilience	17.48	16.42	.023
Confidence Level	10.27	9.75	.209
Physical Symptoms	14.73	14.67	.883
Energy Level	14.13	13.92	.713
Workload	13.78	21.09	.000
Relationships	25.48	24.54	.369
Recognition	13.79	11.67	.000
Organization Climate	12.28	13.68	.003
Personal Responsibility	10.89	13.08	.000
Managerial Role	6.49	11.76	.000
Home-Work Balance	12.28	13.97	.021
Daily Hassles	10.42	11.67	.003
Patience-Impatience	17.81	18.44	.130
Personal Influence	10.96	12.19	.000
Type A Drive	14.81	15.92	.004
Control	15.53	17.37	.000
Life-Work Balance	17.05	16.61	.315
Problem Focus	23.26	25.72	.000
Social Support	10.73	10.79	.871

*stress*, but also in how it should be measured. Researchers and practitioners use a wide variety of instruments, the data are collected using inconsistent methodologies, and the results are often interpreted in idiosyncratic ways. This lack of standardization makes it increasingly difficult for researchers to gain any consensus on the nature of stress at work. A further problem is that models such as the work-strain relationship (Karasek, 1979) focus on relatively few variables and may miss a number of characteristics that have a profound influence on workplace well-being (Sparks & Cooper, 1998). Stress is complex, multivariate, and multilevel, therefore questionnaires measuring a broad range of variables may explain more of the variance in outcomes (Fletcher & Jones, 1993).

There is, therefore, a clear need for a comprehensive, broad-based, integrated measure of occupational stress. The OSI was the first stage in the development of such a measure and, with the benefit of a very large normative database ( $N > 20,000$ ), the OSI has provided a useful tool for researchers and practitioners. However, the OSI has its limitations. The basic elements of mental and physical well-being, job satisfaction, and sources of pressure have been found to work well; the measures of individual difference, however, are flawed and preclude a full understanding of the stress process.

The PMI has addressed many of the weaknesses in the OSI and is a significant improvement on the original questionnaire. It is shorter, more reliable, more robust, and the scale structures are conceptually clear and more comprehensive than those in the OSI. However, to date most of the research using the PMI has focussed on its use in comparative studies of occupational or organizational groups. The validity of many of the PMI's scales still needs to be demonstrated.

The results of the comparative analyses reported in this article are extremely encouraging as an informal test of the predictive validity of the PMI. The results show that the PMI discriminates between groups in an appropriate manner and, as in the comparison of leavers and nonleavers, provides information that will enable organizations to identify problems in the workplace. The comparison between the psychiatric outpatients and the general population demonstrates the value of the Mental and Physical Health Scales as valid predictors of ill health. These results provide an early indication that the PMI scales do in fact measure what they purport to measure. The clarification of the factorial structure and improvements in the reliability of the scales should have improved the validity; this needs to be assessed through further research. The PMI is therefore offered as a robust and reliable questionnaire for other researchers to validate.

Table 12  
*Differences in Pressure Management Indicator  
 Mental Health Scale Scores*

Subscale	Psychiatric patient <i>M</i>	Population <i>M</i>	<i>p</i>
State of Mind	22.43	19.88	.000
Resilience	13.08	17.01	.000
Confidence Level	14.79	10.14	.000

To further researchers' understanding of stress and the role of the variables measured by the PMI, more emphasis needs to be given to longitudinal rather than cross-sectional studies. A number of longitudinal studies are currently in progress that should address this concern. These include a large-scale study ( $N > 2,000$ ) combining the PMI with a comprehensive health check questionnaire and some biomedical data. Although this study is not yet complete, early results indicate that the PMI is providing insight into the relationship among pressure, individual differences, and objective outcomes such as poor physical and psychological health, attrition, and excessive use of alcohol. Longitudinal studies using the PMI suggest that the Mental Well-Being Scale measuring resilience may be stable over time and that resilience should perhaps be regarded as a personality characteristic rather than a stress outcome. The extent to which this scale is a moderator or an outcome variable is under investigation and will be reported in due course.

It seems likely that the traumatic shifts in the nature of work experienced in the past two decades will continue. Therefore the PMI needs to remain sufficiently flexible and adaptable to respond to these structural changes. To achieve this objective the core instrument must be subjected to regular review and must be able to incorporate additional modules sensitive to new patterns of working. Although the PMI covers a broad range of variables it is not all embracing. Every organization is different and the core scales of the PMI need to be supported by organization-specific items designed to measure the demands placed on employees in that particular environment. For example, a recent study in a major retail company added items to the PMI to measure fairness-at-work issues such as harassment, discrimination, and intimidation. Another study in a government department added environmental measures such as temperature, light, and noise levels. More topically, a large-scale study in the information technology division of a multinational company included a series of items on the role of the millennium bug as a source

of pressure. Over time, these organization-specific questions will be evaluated across other organizations, and more general occupation specific measures may emerge. In this way an item bank can be developed to further expand the comprehensive nature of the instrument.

In use, the PMI has demonstrated its effectiveness as a diagnostic tool that enables individuals and organizations to receive a comprehensive, integrated, understandable assessment of occupational stress. On the basis of this assessment, individuals and organizations may design and implement appropriate interventions and subsequently monitor the effectiveness of these interventions. The PMI has been used to provide an assessment, prompt appropriate individual and organizational intervention, and monitor progress. In the words of the chief medical officer of a leading British company, the PMI "succeeds in combining investigation with intervention."

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