

Development of Four Self-Report Measures of Job Stressors and Strain: Interpersonal Conflict at Work Scale, Organizational Constraints Scale, Quantitative Workload Inventory, and Physical Symptoms Inventory

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Despite the widespread use of self-report measures of both job-related stressors and strains, relatively few carefully developed scales for which validity data exist are available. In this article, we discuss 3 job stressor scales (Interpersonal Conflict at Work Scale, Organizational Constraints Scale, and Quantitative Workload Inventory) and 1 job strain scale (Physical Symptoms Inventory). Using meta-analysis, we combined the results of 18 studies to provide estimates of relations between our scales and other variables. Data showed moderate convergent validity for the 3 job stressor scales, suggesting some objectivity to these self-reports. Norms for each scale are provided.

The investigation of job-related stress involves studying the relationship between stressful aspects of jobs (normally termed *stressors*) and the reputed results of stressor exposure (normally termed *strains*). Although several diverse theoretical models of the process by which stressors impact employees exist (e.g., Ivancevich & Matteson, 1980; Jex, in press; Jex & Beehr, 1991; Kahn & Byosiere, 1992), most models propose that employees are exposed to stressful working conditions, these conditions are perceived, and finally employees exhibit strains, which can include behaviors (e.g., increased smoking), physical illness, and psychological distress. On the job stressor side, there have been only a limited number of scales developed, which has tended to focus the field on a relatively small number of potential job stressors, for example, role ambiguity and role conflict. Yet research clearly suggests an important role for other job stressors that have received inadequate attention, such as interpersonal conflict in the workplace (Keenan & Newton, 1985) and organizational constraints on performance (Peters & O'Connor, 1980). In this article, we describe the development of three job stressor scales and one job strain scale. Two of the job stressors, interpersonal

conflict and organizational constraints, have been rarely studied and are in need of new scales. The other job stressor scale of workload and the physical symptoms scale join the ranks of scales available to researchers.

The Scales

In this article, we describe the development of the four scales and summarize findings with them from 18 studies. These scales are designed to measure three stressors and one strain. The Organizational Constraints Scale (OCS) was intended to measure constraints on performance at work, the Interpersonal Conflict at Work Scale (ICAWS) was intended to measure conflict with other people at work, the Quantitative Workload Inventory (QWI) was intended to assess the amount of work and work pace, and the Physical Symptoms Inventory (PSI) was intended to assess the number of somatic symptoms experienced. Because research using these scales has been conducted over the past decade, we were able to utilize meta-analysis to summarize results. The advantage of using meta-analysis over a single validation study is that the meta-analytic results provide a more accurate estimate of the correlations between these scales and other variables within a working population. They help guard against Type I error and provide information about how well results generalize across different working populations.

The results of the meta-analysis provide evidence for nomological validity by summarizing relations of our scales with other variables. We also provide some findings concerning convergence of the three job

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stressor scales with alternative, nonincumbent measures to see how well sources are related. The pattern of what each scale does and does not relate to helps illuminate the nomological network by which we interpret the meaning of these measures. Internal consistency reliability is relevant for only two of these scales, the ICAWS and QWI, because the other two are causal indicator scales.

Causal Indicator Versus Effect Indicator Scales

Although not often discussed in the literature, there is an important distinction between causal and effect indicator measures (Bollen & Lennox, 1991). The traditional measurement approach adopts the effect model, in which each item is assumed to represent a single underlying construct. In structural equation modeling terms, we say that the underlying construct causes the level of the items. If a person likes his or her job, it is liking that leads to agreeing strongly with favorably worded items on a job satisfaction scale. Each individual item is a parallel form of a measure assessing a specific construct. For example, we would expect that a person who agrees with "I like my job" will likewise agree with "I enjoy my job." In a carefully developed scale, the items all interrelate, and we use measures of internal consistency to assess reliability under the presumption that items are more or less interchangeable. The ICAWS and the QWI are both effect indicator scales and should be evaluated using the traditional criterion of internal consistency.

The causal approach assumes that a measure is comprised of conceptually distinct components, each indicated by a separate item or subset of items. The items are not indicative of the same construct, although they can be highly related. One can consider that the construct being measured is comprised of or caused by the specific components being combined to assess it. Because the items are not interchangeable, internal consistency is irrelevant as a measure of reliability. A checklist of behaviors comprising a category is an example of this measurement model. One could develop a measure of organizational citizenship behaviors, for example, that asks for a rating of how often the individual performs each of a list of specific actions, such as helping new employees learn procedures or volunteering to stay after work. These behaviors are both classified as indicators of citizenship, but they are not equivalent. We would not expect that people who perform one behavior will necessarily perform the other. What if an individual who performs the former has elementary school children and cannot stay at work late, and

what if an individual who performs the latter works in a department where there are no new employees? This is quite different from the job satisfaction example in which each item is a variation on the same theme. The OCS and PSI are both causal indicator scales for which internal consistency reliability is not relevant.

Organizational Constraints

Organizational constraints represent situations or things that prevent employees from translating ability and effort into high levels of job performance. The OCS was based on the work of Peters and O'Connor (1980), who listed 11 areas of constraints that interfered with job performance. These common situational constraints in organizations may include faulty equipment, incomplete or poor information, or perhaps interruptions by others. The OCS contained one item for each of the constraints areas. Although situational constraints is treated as a single variable, individual items of the scale are not considered parallel forms of the same construct. Having poor equipment, for example, is not equivalent to being interrupted by coworkers. Although we might sum the number of constraints, presuming that the larger the number, the more constraints, we would not expect the individual items to be highly and uniformly intercorrelated.

Because situational constraints, by definition, are things that interfere with job performance, we expected it to relate to performance. In addition, it should relate to affective strains, such as frustration and job dissatisfaction (Peters & O'Connor, 1988; Villanova & Roman, 1993), and the by-product of job dissatisfaction, intention of quitting (e.g., Carsten & Spector, 1987). We further predicted that situational constraints would be positively related to physical symptoms typically associated with job stress. Given the frustration likely associated with constraints, it is quite possible that these may have physical manifestations.

Interpersonal Conflict

Interpersonal conflict has not been studied extensively in the occupational stress literature, although there is some indication that this may be one of the most important stressors (e.g., Keenan & Newton, 1985). Interpersonal conflict in the workplace may range from minor disagreements between coworkers to physical assaults on others. The conflict may be overt (e.g., being rude to a coworker) or may be

covert (e.g., spreading rumors about a coworker). The ICAWS was designed to measure how often people experience disagreements or are treated poorly at work.

We expected that interpersonal conflict would be associated with both physical and psychological strains. We expected that interpersonal conflict would likely relate to a variety of emotional reactions, including anxiety, depression, and frustration. In the short run, conflicts can lead to feelings of frustration. Over time, the failure to get along with others is likely to make an individual apprehensive about coming to work and may very well induce feelings of depression. As with constraints, we expected that interpersonal conflict would relate to physical symptoms.

Workload

In a very general sense, workload simply represents the sheer volume of work required of an employee. This definition, however, belies the underlying complexity of this variable. That is, workload can be measured in terms of number of hours worked, level of production, or even the mental demands of the work being performed. The QWI is a measure of perceived amount of work in terms of pace and volume.

The pattern of relations with workload was expected to be somewhat different from the other two stressors. Both constraints and conflict are psychosocial stressors to a great extent, arising in whole or part from interactions among people. Workload, on the other hand, concerns tasks more than people. Furthermore, just having a large amount of work does not necessarily lead to distress in the same way that constraints or interpersonal conflict might. Many individuals might enjoy work and might not find having a lot to do unpleasant. Therefore, we expected smaller correlations of workload than the other two job stressors with job strains.

However, we still expected workload to relate with psychological job strains and have the strongest relations with anxiety and frustration. The reasoning behind this prediction was that a high workload is likely to result in some level of uncertainty for the employee (Beehr & Bhagat, 1985) about whether he or she can get all of the work done. Such uncertainty is likely to engender feelings of anxiety and worry. With respect to frustration, it is also the case that high levels of workload will result in some degree of goal blocking. An employee may have so much to do that he or she may be forced to neglect certain aspects of the job or life, which would most likely be experienced as frustrating. Finally, we expected some

relations of workload with physical symptoms, because of their link to emotional responses, as we noted earlier.

Physical Symptoms

Employee health has received much attention in the occupational stress literature, due largely to increasing health care costs (e.g., Ganster & Schaubroeck, 1991). Although the methods used to measure health have varied widely, the most popular approach has been to measure employees' self-reports of symptoms. The PSI asks respondents whether they have experienced a number of physical symptoms and which of these symptoms have been severe enough to warrant medical attention. Three indices are produced for the respondent: the number of symptoms not requiring a doctor, the number of symptoms requiring a doctor, and total number of symptoms. As with the OCS, we see this as a causal indicator in which the individual items do not reflect a single underlying construct. A headache, for example, is not equivalent to tiredness.

The symptoms assessed here were somatic in nature, that is, they were presumably physical manifestations that a person can perceive, such as nausea or pain. Although for some symptoms it might be possible to physically verify their existence, in many cases there is no objective test. Thus, there is a large psychological component to symptoms such as pain, where a physical cause often cannot be determined. By separating physical symptoms into those requiring and not requiring a doctor's intervention, we separate to some extent physical illness from psychological distress. Symptoms for which a doctor's assistance is sought are likely to be more serious than those that the person handles alone.

We expected that the number of symptoms reported to doctors would be correlated with the number of doctor visits. This correlation essentially provides an assessment of convergent validity, because we would certainly expect that the more symptoms are reported, the more a person will go to the doctor. Likewise, we expected that symptoms reported to doctors would relate to absenteeism. Again, symptoms serious enough to visit a doctor should produce time away from work, if for no other reason than to keep appointments.

In terms of nomological validity, we expected that physical symptoms would be positively correlated with stressors and psychological strains. As a strain, we expected that symptoms could be a physical reaction to job stressors. In all cases, however, we expected that the number of symptoms reported not

requiring a doctor would be more strongly correlated with job stressors compared to symptoms requiring medical attention, because they better reflect psychological distress, and psychological distress is more closely tied to job stressors. Furthermore, we expected to find much less variance in the symptoms requiring a doctor, which will tend to attenuate correlations.

Negative Affectivity

Prior research has shown that negative affectivity relates to a variety of job stressors and job strains (Brief, Burke, George, Robinson, & Webster, 1988; Chen & Spector, 1991; Heinisch & Jex, 1997; Moyle, 1995). A number of explanations for this have been advanced, including that negative affectivity is a bias that inflates correlations among job stressors and job strains (e.g., Brief et al., 1988) or that negative affectivity affects job stressors themselves (e.g., Moyle, 1995; Spector, Zapf, Chen, & Frese, in press). Although our data do not address the causes, we did expect to find correlations of our job stressor and job strain scales with measures of negative affectivity. In particular, we expected to find moderately strong correlations between negative affectivity and our measure of physical symptoms, because health complaints can be a physical manifestation of negative emotions, such as anxiety (Watson & Clark, 1984).

Validity of Self-Report Measures

Despite frequent criticism, the vast majority of job stress researchers continue to use subjective self-reports measures for both job stressors and job strains (Jex & Beehr, 1991). Part of the reason is undoubtedly because it makes data collection relatively easy, but ease alone has not made this approach so popular. First, there is a sound theoretical reason behind this choice. Self-reports represent incumbent perceptions, and perceptions represent an important mediating process in the occupational stress process (e.g., French & Kahn, 1962). In addition, many of the strains we find most interesting are psychological in nature, involving attitudes and emotions. For psychological job strains, such as emotional states, the only viable means of measurement is to ask individuals how they feel. Second, alternatives to self-reports used in job stress research have not proved to be superior in many cases. Objective measures of job stressors that use methods other than employee self-report (Frese & Zapf, 1988) and physiological

measures of job strains (Fried, Rowland, & Ferris, 1984) have been shown to be problematic and can be less accurate measures of what was intended than are self-reports.

Considering the widespread use of self-report measures of job-related stressors and strains, it is surprising that relatively little attention has been paid to demonstrating construct validity of specific scales. Relatively few scale development articles are published, despite the existence of hundreds of scales. Many scales are introduced into the literature by being part of a job stress study involving other measures. Buried in the method section is a paragraph or two discussing development and reliability. Because at that time scales are new, few data yet exist that reflect construct validity or psychometric properties.

Some literature discussed possible biases and threats to validity of particular scales (see Spector, 1992; Spector, Van Katwyk, Brannick, & Chen, 1997; Taber & Taylor, 1990) and raised questions about our interpretation of findings in the literature based on such scales. Many researchers have criticized at least some self-report measures as being biased or influenced by common method variance (e.g., Brief et al., 1988; Salancik & Pfeffer, 1977; Schriesheim, Solomon, & Kopelman, 1989; Watson, Pennebaker, & Folger, 1987; Williams, Cote, & Buckley, 1989). Others have noted that self-report measures can be affected by a number of factors other than the construct intended (see Spector, 1992; Taber & Taylor, 1990). On the other hand, there are self-report measures used in occupational stress research that are very useful because they do a reasonable job of reflecting the perceptions and reactions of interest (Howard, 1994; Spector, 1994). However, it must be kept in mind that such measures reflect perceptions that can to some extent reflect objective features of jobs.

As many authors have noted, establishing construct validity is a long-term, cumulative process (e.g., Allen & Yen, 1979; Nunnally & Bernstein, 1994). Evidence of construct validity can be provided in several ways. We develop the nomological network of relations between the scale of interest and other variables. We test to see if our scale has an expected pattern of relations with other variables. This is the main evidence we provide here for validity. *Convergence* refers to the degree to which a measure is correlated with other measures, which purportedly measure the same construct. For example, a test of convergence would be the extent to which ratings on a workload scale completed by two employees holding

identical jobs were correlated. With perceptual measures, such as ours, convergence can help indicate the extent to which the scale reflects common perceptions that might reflect objectivity to some extent. We provide some evidence reflecting convergence as well.

Method

Studies

Nineteen samples from 18 studies provided data for the meta-analysis. There was a total of 3,868 participants in these studies. Overall, the samples were quite heterogeneous in terms of jobs and organizations. Jobs spanned many levels and included blue and white collar and supervisory and nonsupervisory. Examples of job titles were clerk, computer programmer, engineer, firefighter, manager, nurse, police officer, professor, secretary, social worker, and teacher. Some samples were from single organizations, whereas others were from a more general population. Participants were spread throughout the United States, with most from the eastern states.

Procedure Used to Locate Studies

We developed these scales for use in our own research. Although we discussed them in a number of published articles, the items were not published. To use the scales, researchers had to come to us for them, making it easy for us to track who used them. We collected all studies known to us in which these scales were used. This included both published studies and dissertations and theses of our students.

Description of the Four Scales

Organizational Constraints Scale. The OCS is an 11-item scale covering each of the constraints areas discussed in Peters and O'Connor (1980). Each area is assessed with a single item, and a total constraint score is computed as the sum. For each item, the respondent is asked to indicate how often it is difficult or impossible to do his or her job because of it. Response choices range from 1 (*less than once per month or never*) to 5 (*several times per day*). High scores represent high levels of constraints.

Interpersonal Conflict at Work Scale. The ICAWS is a four-item, summated rating scale that was designed to assess how well the respondent gets along with others at work. The items ask about getting into arguments with others and about how often others act nasty. Respondents are asked to indicate how often each item occurs at work. Five response choices are given, ranging from 1 (*rarely*) to 5 (*very often*). High scores represent frequent conflicts with others.

Quantitative Workload Inventory. Originally, the workload scale was designed to assess both qualitative (work difficulty) and quantitative (how much work there is) workload. Its first version, used in Spector (1987), had eight items. In subsequent studies, it became apparent that some items were problematic and that eliminating them would enhance the scale's internal consistency. One item was

dropped for the second version (Spector, Dwyer, & Jex, 1988), and eventually two more items were dropped. In the final version, only five items concerning quantitative workload were retained. Each item is a statement about amount of work, and respondents indicate how often each occurs, from 1 (*less than once per month or never*) to 5 (*several times per day*). High scores represent a high level of workload. For the norms presented here, scores were adjusted for length as if all samples used the five-item version. This was done by first computing the mean score per item and then multiplying by 5, so that the range is always comparable to the final five-item version.

Physical Symptoms Inventory. The PSI was designed to assess somatic symptoms of which a person would be aware. In other words, these are physical conditions involving discomfort or pain, such as headache or stomach upset, as opposed to physical symptoms that cannot be directly experienced, such as blood pressure or cholesterol level. An initial list of 20 symptoms was generated based on prior literature and theory about symptoms likely to be the result of a stress process and was used in Spector (1987). An additional item was added for Spector et al. (1988). However, some items had extremely low endorsement rates, for example, fewer than 1% of respondents, and were dropped in some subsequent studies. At present, 18 items are in the scale. Because the omitted items were almost never endorsed, the various versions of the scale can be directly compared; scores are simply the sum of the symptoms reported.

Each item is a symptom. Respondents are asked to indicate for each if in the past 30 days they did not have it, they had it but did not see a doctor for it, or they had it and saw a doctor for it. Three scores are computed: the number of symptoms for which a doctor was not seen (have symptoms), the number of symptoms for which a doctor was seen (doctor symptoms), and a total that was the sum of both scores. As with the OCS, this is considered a causal indicator scale, meaning the items are considered to be indicators of separate, albeit related, constructs. They can be summed, but internal consistency is not a meaningful measure of scale reliability.

Additional Variables Related to the Four Scales

Across the 18 studies, subsets of these four scales were correlated with a variety of variables. For our purposes, we included only those variables for which there were at least two samples and for which there was a conceptual reason to link it to job stressors or job strains. We omitted, for example, the Hackman and Oldham (1975) core job characteristics, except for autonomy, because they were not relevant to job stress. The remaining variables included measures of other job stressors and strains, personality, demographics, and job performance.

Job stressors included autonomy, assessed with the Hackman and Oldham (1975) Job Diagnostic Survey with the Idaszak and Dragow modification (1987), role ambiguity (Beehr, Walsh, & Taber, 1976; Rizzo, House, & Lirtzman, 1970), and role conflict (Rizzo et al., 1970). In addition, an objective measure of workload—hours worked per week—was assessed. Strains were state anxiety, assessed with a modification of the Spielberger (1979) State-Trait Personality Inventory (STPI), depression (Quinn & Shepard, 1974), frustration (Peters, O'Connor, & Rudolf,

Table 1
Descriptive Statistics for the Four Scales

Scale	<i>M</i>	<i>SD</i>	<i>n</i>	No. samples	Coefficient α	Possible range
OCS	21.3	7.4	1,746	8	.85	11–55
ICAWS	7.1	2.4	3,363	13	.74	4–20
QWI	16.5	3.4	3,728	15	.82	5–25
PSI, have symptoms	4.8	3.5	1,293	6	—	0–18
PSI, doctor symptoms	0.5	1.3	1,293	6	—	0–18
PSI, total	5.4	3.6	1,514	8	—	0–18

Note. OCS = Organizational Constraints Scale; ICAWS = Interpersonal Conflict at Work Scale; QWI = Quantitative Workload Inventory; PSI = Physical Symptoms Inventory.

1980), and job satisfaction (Cammann, Fichman, Jenkins, & Klesh, 1979; Spector, 1985). In addition, intent to quit, absence, and doctor visits within the past 30 days were assessed with one-item measures. Demographics were age in years and gender, coded 1 for *male* and 2 for *female*. Personality included self-esteem (Rosenberg, 1965) and both the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) and trait anxiety from the STPI (Spielberger, 1979) as measures of negative affectivity. Job performance was assessed as supervisor ratings.

Analyses

Because we had 19 data sets, we thought it was best to summarize results with a meta-analysis. We chose to use the Rosenthal (1991) approach, which involves reporting descriptive statistics, such as means and standard deviations. Our descriptive statistics were taken from the samples and were not weighted by sample size. This approach has been widely used in the social sciences. Although in our field the Hunter-Schmidt (Hunter & Schmidt, 1990) approach has predominated, it is not feasible here because in most cases we have relatively few samples.

Results

The four scales yield six different scores, one each for the three job stressor scales and three for the PSI:

have symptoms, doctor symptoms, and total symptoms. Table 1 summarizes descriptive statistics for the six scores, including means, standard deviations, sample size across all samples, number of samples, coefficient alpha, and possible range. Although the OCS is a causal indicator scale for which internal consistency is not relevant, we report the coefficient alpha. For the OCS and ICAWS, the mean was skewed toward the low end of the possible range. For both scales, the middle of the possible range (33 and 12, respectively) was more than a standard deviation above the mean. This suggests that most people perceive relatively low levels of these stressors, and the distributions exhibit restriction of range. For the QWI, the mean was slightly above the center of the scale (15), showing less range restriction. As might be expected, far more symptoms were reported as being experienced than as needing a doctor, suggesting that people seek medical help for these problems when they experience them less than 10% of the time.

Table 2 contains correlations among the six scores from the four scales. Number of studies is in the upper diagonal whereas correlations are in the lower. These correlations show relatively low correlations, below

Table 2
Intercorrelations Among the Four Scales

Scale	OCS	ICAWS	QWI	PSI, have symptoms	PSI, doctor symptoms	PSI, total
OCS	—	6	6	3	3	5
ICAWS	.44	—	12	8	8	7
QWI	.43	.20	—	8	8	9
PSI, have symptoms	.24	.25	.24	—	8	5
PSI, doctor symptoms	.18	.12	.08	-.05	—	5
PSI, total	.26	.26	.27	.94	.30	—

Note. Lower diagonal contains correlations; upper diagonal contains number of samples. OCS = Organizational Constraints Scale; ICAWS = Interpersonal Conflict at Work Scale; QWI = Quantitative Workload Inventory; PSI = Physical Symptoms Inventory.

.30 among most of these scales, except for have symptoms and total symptoms. These two symptom scores are quite equivalent, because most of the total score was comprised of have symptoms. There was essentially no correlation ($-.05$) between have symptoms and doctor symptoms, suggesting they are independent constructs. The three job stressors correlated with one another from .20 (ICAWS and QWI) to .44 (ICAWS and OCS). The modest relation between conflict and workload might well reflect that the former is interpersonal, whereas the latter is task oriented. The constraints scale, which includes aspects of both domains, correlated equally with both other job stressor scales. The stressor scales correlated modestly with the symptom scales.

Table 3 summarizes correlations of our scales with other job stressors, demographics, and personality. Each of the six scores had somewhat different patterns of interrelationships, except have symptoms and total symptoms, which seem interchangeable. The OCS correlated most strongly with role ambiguity and role conflict and correlated more moderately with negative affectivity. The ICAWS related most strongly with role conflict and related to a lesser degree with role ambiguity and negative affectivity. QWI related most strongly to role conflict and to work hours per week. The relation between QWI and work hours can be considered indicative of convergent validity, because work hours are expected to relate with perceived workload. As expected, the QWI had the strongest relationship with hours of all scales. Have symptoms correlated most strongly with negative affectivity and self-esteem and had only modest relations with the job stressors. Doctor

symptoms had very small correlations with all but negative affectivity. Finally, gender had little relation with the job stressors, except for QWI, with women perceiving greater workload.

Table 4 contains correlations of our scales with strains. Again, some different patterns of relations emerged. OCS and ICAWS showed similar magnitudes of relations with most strains and showed the biggest correlations with psychological strains, such as anxiety, frustration, intent to quit, and job satisfaction. The QWI also showed the strongest relations with psychological strains; but for the most part, the magnitude of its relations was lower than for the other two job stressor scales. In particular, it does not seem to relate much to job satisfaction. Have symptoms also related most strongly to psychological strains, although it related more strongly to anxiety and depression than did any of the job stressors. Doctor symptoms, however, showed a very different pattern. As expected, it related strongly to going to the doctor and related moderately to absence. Presumably, absence reflects time off because of illness. This strain scale did not show much relation with psychological strain.

In addition to these data, we also had, from several studies, correlations between job incumbents and others (peers, subordinates, and supervisors) for the job stressor measures. The weighted (by sample size) mean correlation between sources for the OCS was .26 across five correlations from three samples, for the ICAWS it was .30 for one sample, and for the QWI it was .35 across five correlations from three samples. As noted earlier, these different perspectives do not necessarily reflect multiple measures of

Table 3
Mean Correlations of the Four Scales With Dispositional Variables and Job Stressors

Scale	OCS		ICAWS		QWI		PSI, have symptoms		PSI, doctor symptoms		PSI, total	
	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>
Autonomy	-.21	5	-.20	7	-.04	9	-.11	5	-.03	5	-.09	5
Role ambiguity	.44	6	.29	12	.13	14	.13	8	.09	8	.16	7
Role conflict	.61	4	.40	8	.38	9	.20	5	.11	5	.18	4
Hours/week	.19	2	.03	1	.33	2	.13	1	.04	1	.07	1
Age	-.03	2	-.06	2	-.09	5	—	—	—	—	-.11	1
Gender ^a	-.01	2	.15	1	.24	2	—	—	—	—	—	—
Negative affectivity	.30	3	.33	6	.13	5	.46	3	.19	3	.40	4
Self-esteem	—	—	-.04	1	-.04	1	-.26	2	.03	2	—	—

Note. *n* = number of samples; OCS = Organizational Constraints Scale; ICAWS = Interpersonal Conflict at Work Scale; QWI = Quantitative Workload Inventory; PSI = Physical Symptoms Inventory.

^a Gender was coded, so high scores represent females.

Table 4
Mean Correlations of Four Scales With Job Strains

Scale	OCS		ICAWS		QWI		PSI, have symptoms		PSI, doctor symptoms		PSI, total	
	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>
Anxiety	.38	4	.36	6	.40	8	.47	4	.14	4	.48	6
Depression	—		.38	3	.21	3	.46	2	.18	2	—	
Frustration	.47	5	.32	9	.46	8	.26	7	.08	7	.28	6
Job satisfaction	-.38	7	-.32	10	-.17	12	-.21	7	-.06	7	-.23	8
Intent to quit	.46	5	.41	4	.24	5	.29	4	.17	4	.33	5
Doctor visits	.17	2	.15	2	.10	2	.08	3	.54	3	.25	3
Absence	.06	3	.07	2	.03	4	.10	3	.31	3	.19	3
Job performance	-.11	3	-.10	2	.16	3	.02	2	-.11	2	.01	2

Note. *n* = number of samples; OCS = Organizational Constraints Scale; ICAWS = Interpersonal Conflict at Work Scale; QWI = Quantitative Workload Inventory; PSI = Physical Symptoms Inventory.

incumbent perceptions. Rather, they illustrate that there is to some extent an aspect of objectivity in these measures. Considering the limited accuracy of such alternative measures (Frese & Zapf, 1988), these are certainly underestimates of convergence.

Discussion

Our purpose in this article was to provide information about four scales that are potentially useful to job stress researchers. The three job stressor scales were the ICAWS, OCS, and QWI, and the strain scale was the PSI. We included data from 18 studies reflecting norms and construct validity. Most of the validity evidence was provided with a meta-analysis, relating these scales to one another and to several other variables. Limited data concerning convergence were also available. Providing this kind of information to researchers considering the use of a scale is important, because most job stress scales become widely adopted without much information about psychometric properties. In addition, norms are often lacking with popular scales, making it difficult to determine if a particular sample is typical or unusual.

Our use of these scales in 18 studies resulted in a sample that was quite diverse in terms of geography and types of jobs and people represented. Our norms are reasonably representative standards against which to compare a given sample. Two of the scales, OCS and PSI, were causal indicator scales for which internal consistency reliability would be inappropriate as a standard. Although the coefficient alpha for the OCS was quite good (.85), it suggests that these constraints are related in organizations or at least the

perceptions of them are related. The other two effect indicator scales, ICAWS and QWI, demonstrated good internal consistency across several samples.

Nomological validity from the meta-analysis showed a pattern of correlations that conformed reasonably well to what would be expected based on prior occupational stress theory and research (Jex & Beehr, 1991; Kahn & Byosiere, 1992). For the most part, correlations between our scales and other variables were as expected. Specifically, the job stressor scales were correlated with affective strains and have symptoms, but the workload scale had smaller correlations than the other two job stressor scales with depression and job satisfaction. On the other hand, the organizational constraints scale had a quite small relation with job performance, which runs counter to expectations. This was surprising because other studies have shown a link between constraints and objective measures of performance (Klein & Kim, 1998). Perhaps it was the use of supervisor ratings, which might reflect effort as much as results, that was responsible. An employee who manages to perform satisfactorily under constraints might be overrated by supervisors in terms of actual productivity. Have symptoms correlated moderately with some job stressors and with affective strains, especially anxiety and depression, whereas doctor symptoms did not. Negative affectivity correlated as expected with the OCS and ICAWS and to a lesser extent with the QWI. It also was strongly related to have symptoms, which is as expected because somatic symptoms have long been shown to be a manifestation of neuroticism and trait anxiety (Costa & McCrae, 1987). However, the doctor symptoms were not related to negative

affectivity, suggesting that they do not reflect physical manifestations of psychological distress as well.

It was encouraging to find that each measure had a somewhat different pattern of relations with others and that relations of these scales with one another and other scales were in many cases quite small. In fact, only two correlations of our scales with other scales exceeded .50, with most in the .30 range or smaller. This pattern lends confidence to the belief that relations here are not just a manifestation of common method biases. If this were the case, the magnitude of correlations among these measures would have been more uniform (Spector, 1994).

The ICAWS related most strongly to organizational constraints, role conflict, intention to quit, and affective reactions, such as anxiety and depression. Its relation was considerably smaller with autonomy, role ambiguity, and workload. The OCS tended to correlate more strongly with other job stressor measures, especially role conflict ($r = .61$, across four studies). This overlap with role conflict might well reflect that this measure is a causal indicator comprised of many constraint areas. To some extent, other job stressors might reflect constraints, making this a somewhat composite measure of several related stressors. For example, role conflict might be conceptualized as a form of constraint that gets in the way of performing the job well. Interpersonal conflict can serve as a constraint in a variety of ways, for example, it can prevent needed teamwork among employees.

Workload correlated most strongly with role conflict and frustration. It was quite distinct from most variables, it was essentially unrelated to autonomy, and it correlated only .13 with role ambiguity. Relations of the workload scale with intent to quit and job satisfaction were smaller than for the other job stressors. Interestingly, workload was more strongly related to frustration than depression, whereas conflict was more strongly related to depression than frustration. This could mean that these different stressors may evoke qualitatively different emotional responses, but self-report data such as these alone cannot provide convincing evidence for this possibility.

The PSI divided symptoms into those experienced (have symptoms) and those for which a doctor's assistance was sought (doctor symptoms). Each score had its own pattern of relations. Have symptoms was related about the same with each of our three job stressors and with role conflict, but it showed little relation to autonomy or role ambiguity. The PSI scale

of have symptoms was related to affective strains, with correlations being strongest for anxiety and depression. On the other hand, the doctor symptoms scale was essentially unrelated to have symptoms and had a different pattern of relations than the other symptom scale. It showed little relation with any job stressor or strains and did not show much relation with negative affectivity. It correlated well with doctor visits (which is a very similar concept) and absence.

The differing pattern between the two symptom measures and their lack of interrelation suggest they reflect different constructs. Have symptoms is most likely to reflect the psychological experience of somatic strain, and, not surprisingly, this measure relates well to both affective states (strains) and traits (negative affectivity). Going to the doctor for symptoms suggests more of a physical illness, which has much smaller relations with job stressors and affective strains. The small degree of correlation might indicate effects of jobs on health, but it is equally likely that the psychological component of symptoms is responsible for this relation. Individuals who experience symptoms for entirely psychological reasons might perceive their jobs to be high on job stressors. The reasons cannot be determined without the use of different designs than used here.

We had only limited data reflecting convergent validity and only for the three job stressor scales. Relations with parallel measures of the same scales completed by others (e.g., supervisors) showed moderate convergence across sources, ranging from .26 for the OCS to .35 for the QWI. These findings are encouraging in that they suggest that incumbent responses are not totally independent of the objective work environment. However, because ratings of an incumbent's job by others is likely to be somewhat inaccurate (Frese & Zapf, 1988), our correlations should be considered as an underestimate of how well these measures reflect something that is objective, that is, theoretically verifiable by consensus. Furthermore, in the case of the stressor scales, it must be remembered that these are meant to represent an individual employee's perception of his or her work environment. Even though such perceptions are obviously related to the objective environment, they should not be considered a proxy measure for them (e.g., Spector & Jex, 1991). As was pointed out earlier, perceptions are an important component of most occupational stress theories (e.g., French & Kahn, 1962) and are worthy of study on their own merits.

Future research should continue to explore the construct validity of measures used in occupational stress research. Like the present investigation, it would be useful if such studies used meta-analysis to provide a more accurate estimation of relations among constructs than is typically possible in single studies. Another recommendation for future construct validity research would be to use study designs that would allow true tests of convergent validity. This could involve, for example, measuring stressors through the use of both self-report scales and critical incident descriptions related to these same stressors (see Jex, Adams, Elacqua, & Lux, 1997, for a recent demonstration of this methodology).

Many scales are introduced to the field in an empirical paper in which the scale was used. Other researchers looking for a measure of that construct will begin to use the scale, despite only limited information about psychometric properties. Our four scales have had their introductions done in much the same way. Our goal was to take a step back and summarize findings with these scales, now that they have been used in more than a few studies. The evidence collected to date and summarized here offers an encouraging indication that these scales assess meaningful constructs. However, because validity can never be proven, our case must remain tentative. The use of perceptual measures has been controversial, despite their popularity, because of a concern about what incumbent self-reports might actually represent. We view these job stressor scales as reflecting perceptions of the job, which are a function to some extent of objective reality and to some extent of other factors (Spector, 1992; Taber & Taylor, 1990) that are more idiosyncratic to the respondent. The PSI assesses perceptions of internal physical symptoms, but only those that can be sensed, such as headaches or stomach upset. It does not reflect other manifestations of health, for example, blood pressure or cholesterol, that require other methods for detection. However, many of the PSI symptoms cannot be measured except by self-reports. There is no reliable physical test for pain, for example.

These four variables are important components of the job stress process, and are most relevant to psychological well-being at work. They will undoubtedly prove most useful when linked to other types of measures of both objective job stressors and physical strains, because perceptions in most job stress models serve a mediating role between the environment and health.

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Correction to Theorell and Karasek (1996)

In the article "Current Issues Relating to Psychosocial Job Strain and Cardiovascular Disease Research," by Töres Theorell and Robert A. Karasek (*Journal of Occupational Health Psychology*, 1996, Vol. 1, No. 1, pp. 9-26), there was an omission.

On p. 12, in the caption to Figure 2, the copyright statement is missing. The caption should have read "The environment, the worker, and illness: Dynamic associations linking environmental strain and learning to evolution of personality. From *Healthy Work: Stress, Productivity, and the Reconstruction of Working Life* (p. 99), by R. A. Karasek and T. Theorell, 1990, New York: Basic Books. Copyright 1990 by Basic Books. Used with permission."
