

A META-ANALYSIS OF WORK DEMAND STRESSORS AND JOB PERFORMANCE: EXAMINING MAIN AND MODERATING EFFECTS

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We quantitatively integrated 169 samples ($N = 35,265$ employees) that have been used to investigate the relationships of the following 7 work-related stressors with job performance: role ambiguity, role conflict, role overload, job insecurity, work–family conflict, environmental uncertainty, and situational constraints. Overall, we obtained a negative mean correlation between each job performance measure and each stressor included in our analyses. As hypothesized, role ambiguity and situational constraints were most strongly negatively related to performance, relative to the other work-related stressors. Analysis of moderators revealed that (a) the negative correlation of role overload and performance was higher among managers relative to nonmanagers; (b) publication year moderated the relation of role ambiguity and role overload with performance, although in opposite directions; (c) the correlations obtained for published versus unpublished studies were not significantly different; and (d) using the Rizzo et al. scale of role ambiguity and role conflict decreased the magnitude of the correlations of these stressors with performance, relative to other scales. Theoretical contributions, future research directions, and practical implications are discussed.

Psychosocial stressors at work represent a ubiquitous and multifaceted phenomenon (Lazarus, 1993); several theoretical frameworks predict that they affect employee attitudes and behaviors (Jex & Crossley, 2005). Most past meta-analytical reviews of these relationships focused only on the linkages of role conflict and role ambiguity with job performance, none of

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them related to unpublished studies, and each included only a relatively small number of samples, casting doubt on their findings regarding the effect of possible moderators (e.g., Abramis, 1994, $n = 18$ for role ambiguity only; Fisher & Gitelson, 1983, $n = 25, 22$; Jackson & Schuler, 1985, $n = 37, 24$; Tubre & Collins, 2000, $n = 74, 54$ for the meta correlations of performance with role ambiguity and role conflict, respectively). All previous meta-analytical reviews found that a substantial amount of the variance in the corrected stressor–performance correlations remained unexplained and urged future researchers to identify variables that moderate this relationship (e.g., Tubre & Collins, 2000, p. 166).

We have advanced and refined this knowledge concerning the relationships between stressors and job performance in three major ways. First, in addition to role ambiguity and role conflict, we have included role overload, job insecurity, work–family conflict, and situational constraints, four stressors that have been covered to only a limited extent by prior meta-analytical studies, and environmental uncertainty, which has not been examined in relation to job performance in any previous quantitative review. All seven stressors share a common conceptual denominator in that they reflect stimuli that are perceived by individuals as placing demands upon them and in that they correspond to the notion of chronic stressors as conceptualized by Lazarus (Lazarus, 1999) and by Wheaton (1999). Our comprehensive literature search on demand-based stressors reveals that only the above seven work stressors were those whose associations with job performance were found in at least four samples, which we determined as our minimum threshold to run a meta-analysis, to avoid reporting on chance results. Including these stressors in a meta-analysis is warranted because of the lack of clarity on how they may relate to performance. As we elaborate below, although all seven stressors are associated in one degree or another with hindrance at work, which may limit performance (see LePine, LePine, & Jackson, 2004; LePine, Podsakoff, & LePine, 2005), there are some important differences between them that may affect their relationships with performance.

Second, our approach to conceptually defining job performance was also comprehensive. Following past meta-analytical studies and the literature on the different facets of job performance, we covered all sources of performance ratings: self-rated performance, supervisor-rated performance, objective performance measures (e.g., sales volume), and general ratings of job performance (representing any combination of the above sources). We included the measure of general performance in our study to enable comparison of our findings with those reported with earlier meta-analytic inquiries that have used it. In addition, based on Viswesvaran, Ones, and Schmidt (1996), we examined two dimensions of performance: qualitative and quantitative, neither of which has hitherto been investigated

meta-analytically. Following Viswesvaran et al. (1996) we have defined quality of performance as referring to any assessment of how well the job was done and quantity of performance as referring to ratings of quantity or volume of output that an individual has produced, both conceptualized irrespective of the source of the ratings. Qualitative and quantitative measures of performance were found, in a recent meta-analysis, to be only moderately meta-correlated (mean correlation = .34), but the 90% credibility value around this meta-correlation included zero, suggesting that it may be dependent upon situational factors (Viswesvaran, Schmidt, & Ones, 1994). Overall, focusing on multiple measures of performance is important for the purpose of testing the convergent validity of our meta-analytic findings. Moreover, if the results would suggest consistency across all performance measures, it would alleviate concerns about the use of self-rated performance (e.g., self-bias or common method variance) or supervisor-rated performance (e.g., inflated ratings of subordinates who are working in stressful conditions; cf. Westman & Eden, 1991).

Third, we explored several moderators of the stressor–performance relationship, namely, organizational level and publication year, published versus unpublished studies, and types of measure used to assess specific stressors, none of which appear to have been examined in any prior meta-analysis of the stressor–performance relationship.

The Relationship Between a Stressor and Job Performance

Following the theoretical work of Lazarus and his colleagues (e.g., Lazarus & Folkman, 1984), recent studies (for a review, see LePine et al., 2005) suggested that the appraisal of any stressor reflects two basic dimensions: The first dimension, associated with threat or hindrance, is hypothesized to be negatively associated with performance, and the second dimension, reflecting challenge, tends to be positively related to performance (see also Beehr, Jex, Stacy, & Murray, 2000; Jex, 1998; McGrath, 1976).

The theoretical model that explains the expected negative relation between hindrance-based stressors and performance is the negative linear model, which postulates that stressors are detrimental to job performance (e.g., Allen, Hitt, & Greer, 1982; Jamal, 1984, 1985; Kahn & Byosiere, 1992). Several theoretical arguments are provided in the literature to support this type of stressor–performance linkage. First, when employees perceive a demand addressed to them as potentially threatening or eventually harmful, they will use up energy and time to cope with this stressor and with their immediate reactions to it (e.g., anxiety and discomfort). Therefore, work-related stressors are thought to reduce an employee's ability to perform by diverting effort away from performing job functions

and toward coping with the stressors (Jex, 1998). Second, high levels of stressor are invariably associated with involuntary physiological responses that interfere with performance (Lazarus, 1999; Motowidlo, Packard, & Manning, 1986). Third, these high levels of stressor tend to create conditions of information overload, which in turn may lead to a narrowing of individuals' perceptual attention so that they ignore performance-related information and cues, thus deleteriously affecting their job performance (Cohen, 1980). The theoretical model that explains the expected positive relation between challenge-based stressors and performance is the positive linear model, arguing that when a stressor is appraised primarily as a challenge it may lead to internal arousal and higher performance outcomes (LePine et al., 2005; McGrath, 1976).

Differential Relationships of Role Stressors With Performance

The two dimensions, threat or hindrance, and challenge were postulated to be reflected to a different extent in each of the stressors included in this study, leading us to expect that they would be differentially related to performance (cf. Drach-Zahavy & Erez, 2002; LePine et al., 2005). This theoretical approach follows the cognitive-relational model of stress appraisal proposed by Lazarus and his colleagues (e.g., Lazarus & Folkman, 1984; Lazarus, 1999), which posits that, relative to a situational demand, threat and challenge appraisals synergistically interact to produce stress appraisals. As pointed out by Folkman (Folkman, 1984), and as empirically verified in her research with Lazarus (cf. Folkman & Lazarus, 1985), threat and challenge appraisals, a distinguished from one another by their cognitive components, are not mutually exclusive and can occur simultaneously with regard to a situational demand. Therefore, we postulate that, with regard to any type of situational demand under study, the higher the amount of perceived threat and the lower the amount of perceived challenge, the higher the resulting negative effect on individuals' job performance. Moreover, it is important to note that following the above theoretical contributions and accumulated evidence, which indicate that for each of the stressors under consideration one's overall assessment of its stressfulness combines threat and challenge appraisals, we would still expect its relation with performance to be negative. We base this argument on the well-established finding in social psychology that "bad is stronger than good" (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001).

We hypothesized that role ambiguity would be the stressor most adversely related to performance at work. As originally conceptualized (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964), role ambiguity refers to the relative unpredictability of the outcome of an individual's behavior. However, the most popular measure of role ambiguity also includes the

component of lack of input from the environment to guide behavior (Rizzo, House, & Lirtzman 1970, pp. 155–156). We argue that relative to the other stressors, role ambiguity is the least likely to have a challenge component because there are fewer coping processes that could possibly counteract its negative effects (King & King, 1990). This argument is consistent with the argument of Kahn et al. (1964) that relative to other types of stressors, role ambiguity is more structurally determined. Therefore, when ambiguity is high, the individual faces the difficulty of pursuing job assignments because of an inability to modify them (cf., Lazarus & Folkman, 1984). On the other hand, when role ambiguity is low (role clarity is high), employees' knowledge of what is expected of them (their job requirements) and how to achieve these expectations (processes and procedures) are high (Griffin, Neal, & Parker, 2007; Murphy & Jackson, 1999). This in turn facilitates a high level of job control, which is associated with higher job performance (Griffin et al., 2007). All previous meta-analytic reviews that covered role ambiguity supported our expectation of a relatively strong negative association between role ambiguity and performance (Fisher & Gitelson, 1983; Jackson & Schuler, 1985; Tubre & Collins, 2000). Analogously, we expected situational constraints (a situation in which conditions in an employee's immediate work environment inhibit or constrain performance, like improper machinery or inadequate supplies) to follow role ambiguity as most adversely related to performance at work relative to all other stressors. Situational constraints represent a type of stressor likely to be detrimental to an individual's ability to function because the individual often has little control over these constraints (e.g., Jex, 1998; Peters & O'Connor, 1980). The only past meta-analytic study (Villanova & Roman, 1993) found only weak relationships between situational constraints and performance (in field studies, the corrected meta-correlation was $-.05$). Nevertheless, this finding could be due to the research limitations (e.g., only 5 years were covered in the literature search, as compared with 28 years covered by this study).

All other types of stressors included in our study, although primarily associated with hindrance at work, may to some degree also reflect a component of challenge and therefore were expected to have more complex relationships with performance. In the case of role conflict (which refers to a situation of conflict between focal individuals and different senders in the organization), people may negotiate with the different senders some priorities over task assignments, as well as the scheduling of delivery. Concerning role overload (which refers to a situation in which work demands exceed the available resources to meet them), it may have both negative and positive effects on performance. Conceivably, overload could be regarded as a threatening stressor with an adverse effect on performance because it imposes demands on the individual who does not have enough

resources (e.g., time) to overcome them. However, role overload may also occur when high performers take on more tasks and responsibilities and therefore are motivated to perform them well. In this situation, role overload can be perceived as a challenge positively rather than negatively associated with performance (cf., LePine et al., 2005). Indeed, past studies have reported positive, negative, and no associations between overload and job performance (LePine et al., 2004; Spector & Jex, 1998), possibly an indication that it may represent challenge and/or hindrance to the focal individuals. Similar to role overload, the relation of job insecurity and work–family conflict with performance may be complex. Thus, although job insecurity may lead to a reduction in effort and performance, associated with a reduced commitment to the organization, it can also lead to an increase in effort and performance. This may occur if the individual believes that higher performance will improve the organization's success and thus also the security of its employees, or if the individual believes that the organization's decision whom to keep versus whom to let go is contingent upon the contribution of each individual to the performance of the organization. Further, in the case of work–family conflict, it can be expected that this stressor, reflecting incompatible demands at work and home, would be negatively associated with performance (cf. Allen, Herst, Bruck, & Sutton, 2000; Bronneberg, 1995; Yardley, 1995). However, individuals experiencing work–family conflict may feel compelled to keep their performance-related behavior at an acceptable level but may be less willing to engage in any work-related extra-role behavior, as suggested by past empirical research (Allen et al., 2000). Finally, uncertainty regarding the environment (environmental uncertainty) is often viewed as one of the defining features of life in organizations (Duncan, 1972; Ellis & Shpielberg, 2003). However, because of its focus on threats in organizational environment, it represents a distal stressor relative to the other, more proximal stressors, and therefore, we expected it to have weaker linkages with performance relative to the other stressors. Our first hypothesis was therefore:

Hypothesis 1: Among the seven stressors studied in this meta-analysis, role ambiguity and situational constraints will be most strongly negatively related to job performance, relative to the other five stressors.

Potential Moderators

As already noted, all the stressor–performance reviews found a substantial amount of the variance in the corrected stressor–performance correlations that remained unexplained. Therefore, identifying the variables

that moderate the stressor–performance relationship could contribute to our understanding of how stressors influence performance. A large number of potential moderators have been suggested in past qualitative and quantitative reviews of this research area, including age, education, gender, and seniority (e.g., Jex, 1998), but these moderators pose a theoretical challenge in their aggregate form. Several other potentially promising moderators, like climate of trust and involvement, have not been empirically addressed in a sufficient number of studies. In this study we examined the following moderators: job level, namely managers versus nonmanagers; year of publication of the study; published versus unpublished studies; and type of measure used to gauge role ambiguity and role conflict. In the following, we present the rationale for each moderator.

Job Level

Kahn et al. (1964) suggested that job level serves as a moderator of the relationship of role conflict and role ambiguity with various outcomes. However, the direction of this moderating effect is unclear. On the one hand, some researchers (see, Beehr & Drexler, 1986; Hamner & Tosi, 1974; Kahn et al., 1964) claimed that higher-level jobs tend to have more autonomy, decision latitude, and other coping resources (e.g., power, prestige, income) that enable individuals who occupy these jobs to better handle and cope with threatening work-related demands. These individuals also tend to have stronger internal coping resources, such as resiliency, which make it easier to effectively encounter stressful situations (Beehr & Drexler, 1986). Therefore, expectedly, stressors–performance linkages would be weaker among managers as compared with nonmanagers. An alternative argument is that workers in managerial jobs often have more responsibility and obligations, and several past studies (cf. Schieman, Whitestone & Van Gundy, 2006; Schuler, 1980) have shown that, relative to rank-and-file employees, they are more likely to feel “overworked” and to be exposed to a variety of work-related demands. This exposure, in turn, could be expected to lead to stronger stressors–performance linkages among managers relative to nonmanagers (e.g., Cohen, 1980; Szilagyi, 1977). Past meta-analytic studies have reported only limited support for the moderating effect of job level in the area of work stress (e.g., Fisher & Gitelson, 1983; Jackson & Schuler, 1985). We extended these early results by using job level, defined as managers versus nonmanagers, as a moderator across all stressors and categories of performance. Given the alternative rationales for the moderating effect of job level, and the inconsistent findings reported in the literature, we refrain from suggesting a formal hypothesis on the direction in which job level moderates the relation between job stress and performance.

Publication Year

How does time of publication affect the relationship between work stressors and performance? There are alternative rationales that may lead to opposite predictions about the direction of this effect. On the one hand, studies over the years have become more rigorous methodologically, for example, by reducing common method variance, which could have artificially inflated past stressors–performance linkages. Also, some stressors, like role ambiguity, have become more prevalent; therefore, these would suggest a weaker relationship between work stressors and performance over time. On the other hand, the social information processing theory suggests that formally and informally conveyed information influences individuals' attitudes and behavior by directing their attention to certain stimuli (Salancik & Pfeffer, 1978). Indeed, Barley and Knight (1992) attributed the rise in stress claims during the late 1980s to the increased coverage of stress-related news items in the media. This suggests that people have become more aware of the adverse effect of stress on their psychological, behavioral, and physiological reactions, and therefore, are also more comfortable in attributing poor performance to work-related stressors. Consequently, one would expect an increase in the negative relationship between role stress and work performance over time. Because of the conflicting alternative rationales for the direction of the effect of publication year, we refrain from providing a formal hypothesis.

Published Versus Unpublished Studies

Several researchers have raised the possibility that meta-analytic studies may produce inaccurate (e.g., upwardly biased) estimates of the relationships in question because of the publication bias, which reflects the premise that studies producing nonsignificant or unexpected results are less likely to be submitted and less likely to be accepted for publication (Hunter & Schmidt, 1990). If such bias occurs, the resource of literature on the topic of interest becomes biased. Rosenthal and Rubin (1986) labeled this potential bias the “file drawer phenomenon,” and Fried and Ager (1998) suggested that meta-analysts test for it by systematically comparing the results from published and unpublished studies. Following the above rationale, we expected that published studies would tend to report stronger negative correlations between stressors and job performance than unpublished studies, such as dissertations and unpublished conference papers. In this study we focused only on unpublished dissertations because of the

difficulties we encountered in getting unpublished conference papers from the authors. Therefore we hypothesize:

Hypothesis 2: Published papers will report stronger negative correlations between stressors and job performance than unpublished dissertations.

Measurement of Stressor

The Rizzo et al. (1970) role conflict and role ambiguity scales have most often thus far measured these two types of stressors, and thus most past meta-analytical studies of stressor and performance reflect their psychometric characteristics. For example, Jackson and Schuler (1985) reported that 85% of the studies that they meta-analyzed had utilized the Rizzo et al. (1970) measures. There has been considerable criticism and debate in the occupational stress literature about the discriminant, convergent, and predictive validity of the Rizzo et al. (1970) measures (for references to the rich literature, see King & King, 1990 and Netemeyer, Johnston, & Burton, 1990). Tracy and Johnson (1981) in an analysis of the factor loadings of the Rizzo et al. scales found that subjects responded much more clearly to the stressor/comfort dimension than to the conflict/ambiguity dimension of the items. They concluded, therefore, that there is doubt regarding the meaning of each scale. King and King (1990, p. 62) went as far as to draw the following conclusion: "We firmly believe that partial responsibility for the inconsistencies in research findings about role conflict and ambiguity is due to deficiencies in measurement." This early work was followed up by Harris and Bladen (1994), who used CFA in analyzing a multitrait-multimethod matrix of the two types of stressors using different wording and examining their correlations with several criteria. They concluded that there is some wording effect on the two role stressor measures, but that even accounting for this source of method variance, at least some significant relationships remain (Harris & Bladen, 1994). In this study, we compared the association of each of the role stressors relating to ambiguity and conflict with all performance variables separately for studies using the Rizzo et al. (1970) scales and studies using other scales to gauge the same role stressor. Based on the above rationale, we expected that:

Hypothesis 3: The effect sizes obtained for each of the two Rizzo et al. (1970) scales would be lower in magnitude than those obtained using other scales to gauge the same stressor.

*Method**Identification and Selection of Studies*

We combined computer-based and manual search methods to locate as many studies as possible for this meta-analysis. The computerized databases we accessed to elicit relevant articles were PsycLIT, SocLIT, MEDLINE, ABI-INFO, Dissertation Abstracts International, and ERIC databases, covering the years 1975–2002. In examining these databases, we used key words identified on the basis of qualitative reviews (Wheaton, 1997, 1999),¹ among them stressor, stress, hassles, environmental constraints, acute stressor or stress, and job performance. For each category, we searched for all possible types of specific stressors as key words. Altogether, we searched for more than 50 terms in each database. We then reviewed the bibliographies of all previous qualitative and quantitative reviews published on the subject of our research, and to double check for full coverage of all articles, we manually scanned all issues published since 1975 of 14 relevant journals: *Academy of Management Journal*; *Anxiety; Stress and Coping*; *Human Performance*; *Human Relations*; *International Journal of Stress Management*; *Journal of Applied Psychology*; *Journal of Occupational Health Psychology*; *Journal of Organizational Behavior*; *Journal of Personal Selling and Sales Management*; *Journal of Vocational Behavior*; *Organizational Behavior and Human Decision Processes*; *Personnel Psychology*; *Stress Medicine*; and *Work and Stress*.

The relevance of each primary study to our meta-analysis was determined based on how the authors conceptualized and measured the stressor and performance. We defined the population that we wished to generalize a priori as consisting of employed adults. Accordingly, job performance in primary studies needed to occur in a natural job setting and needed to be measured at the individual (as opposed to the group) level. Thus, laboratory studies and studies conducted in learning situations were excluded, as were studies done on students, patients, or other not gainfully employed participants. We included primary studies in which the stressor was assessed as perceived by employees, excluding studies that related to objective stressors like work hours. In addition, we excluded studies that did not report on sample size or that did not include effect sizes or statistics that could be converted to correlation coefficients. In addition,

¹ Based on reviews of the types of stressors in the field (Wheaton, 1997, 1999), we developed a long list of key words used in our searches of the literature. This list included the work-related hassles of noise, light, crowding, transportation, and temperature; the acute stressors of dismissal, layoff, violence, job change, and plant explosion; and—in addition to the chronic stressors represented in our study—under utilization of skills, under-participation, lack of responsibility, interpersonal conflict, and anomie.

when the same sample was used in two or more articles, we considered only the one that provided more information. However, if some variables were reported in one article but not in the other, we used the nonoverlapping data. Concerning the measurement of work–family conflict, we used the variables called work–family conflict or family–work conflict. When we had both in the same article, we combined them into one variable. In most cases, the studies we included in our meta-analysis assessed only work–family conflict. After applying these exclusion criteria, the analysis included a total of 169 independent samples encompassing 35,265 individuals. All in all, there were 374 effect sizes from 104 published studies and 33 unpublished doctoral dissertations. Specifically, there were 145 effect sizes for self-rated performance, 139 for supervisor-rated performance, 31 for objective ratings, 15 for qualitative performance, and 26 for quantitative performance, and 18 effect sizes were coded only as part of general performance because their measures or dimensions were not specified.

Coding²

Variables such as sample size, all reliability indicators, effect size estimates, study source, and characteristics were thoroughly coded. Coding of the moderator variables was straightforward as most of them (e.g., the measure of stressor used, published vs. unpublished papers, publication year, and managers vs. nonmanagers) were clearly indicated in the studies. We coded organizational level as managers only when all study participants held supervisory or managerial positions and nonmanagers when none of the study participants held supervisory or managerial positions, thereby excluding all mixed samples. Moreover, when we coded role ambiguity we included only studies that assessed this construct directly; we did not include studies that reverse-coded positive role-clarity items. In addition, resource inadequacy was coded as a situational constraint (as in Villanova & Roman, 1993).

Although peer ratings are frequently used in performance appraisals (Viswesvaran, Schmidt, & Ones, 2002), we failed to find at least four samples that included correlations between any stressor and peer-rated performance and therefore did not include peer-rated performance in our study. Quality and quantity of performance was defined based on Viswesvaran et al. (1996) as “a measure of how well the job was done” and “ratings of the quantity or volume of work produced,” respectively.

² For the sake of brevity and to reduce the overall size of this contribution, we did not append the list of meta-analyzed studies showing key-coded characteristics of each study. Interested readers are invited to request by e-mail a digital copy of this appendix.

We should note that in many studies the sample size for a specific correlation was different from the overall sample size. Thus, in our meta-analysis we used the sample size that specifically related to the correlation in question. Moreover, in longitudinal studies, we coded the data available for both stressor and performance. If the data were available for several waves of measurement, we used those of the first wave. In field experiments, we used the data available for the pretest.

Primary studies often reported performance information from multiple sources, including objective assessment, supervisor ratings, and self-ratings. To enable us to compare our findings to those of previous stressor–performance meta-analytical studies (such as Tubre & Collins, 2000), in addition to coding each measure of performance, we also computed a general performance construct using the formula proposed by Rosenthal and Rubin (1986). If the primary study did not provide the correlations between the specific measures of performance employed, we used correlations provided by the most recent job performance meta-analysis (Conway & Huffcutt, 1997). It is well established in the meta-analysis literature that correlations based on composites are more valid than correlations based on a single measure (Thoresen, Kaplan, Barsky, Warren, & de Chermont, 2003). In our study the composite measure of general performance takes into account the intercorrelations among the source-specific measures included in it (cf. Hunter & Schmidt, 1990, p. 460). We used the Spearman–Brown prophecy formula (Hunter & Schmidt, 1990, pp. 454–463) to compute the reliability of an equally weighted composite of general performance.

Accurate coding is crucial for a meta-analysis. Therefore, to enhance our confidence in the coding results, after all the 169 samples had been carefully coded, 15% of them were randomly selected and recoded by another coder in order to calculate interrater reliability, which in this study exceeded .90. Note that the interrater reliability coefficients were based on all quantitative information available in the coding sheets. In addition, in order to deal with deficient reporting in primary studies, we corresponded with several of the original investigators to obtain additional information.

Meta-Analytical Procedures

For the statistical analyses, we used the Comprehensive Meta-Analysis software (Borenstein & Rothstein, 1999). We used the meta-analytical procedures of Hunter and Schmidt (2004) to correct observed correlations for sampling error and unreliability in measures of job stressors and job performance. Because some individual studies provided only partial information on these artifacts, the correlations were corrected following the optimal two-stage procedure recommended by Hunter and Schmidt

(2004, pp. 173–175). In the first step, individually known artifacts were corrected. This produced a mean correlation corrected for the individually known artifacts and a variance corrected for those artifacts and for sampling error. The distributions of the artifacts available from the first step were then used to correct for the remaining artifacts (Hunter & Schmidt, 2004, pp. 174–175). This practice is commonly followed in meta-analytic studies (for some cautions and reservations concerning this practice, see Hall & Brannick, 2002).

To correct the various types of stressor and job performance measures for unreliability, we used the internal consistency reliabilities. In Table 1 we report the results of all measures and dimensions of performance using internal consistency estimates (when such estimates were reported). However, in the results section, we also report the correction for measurement error of performance as was suggested by Viswesvaran et al. (1996). Thus, we used Viswesvaran et al.'s meta-analytical estimates of interrater reliability of supervisor ratings (.52) to correct correlation of supervisor ratings. Because no sample reported the reliability of objective measures of performance, we assumed perfect reliability.

Confidence intervals and credibility intervals aid in providing the best estimate of the true nature of the relationship between two variables (Whitener, 1990) and the variability in the correlation. Accordingly, we report both the 95% confidence intervals and the 90% credibility intervals. Confidence intervals provide an estimate of the variability of the corrected mean correlation (ρ) due to sampling error (Hunter & Schmidt, 2004, p. 205). Credibility intervals provide information on the variability of the individual correlations across the samples examined. Credibility intervals are calculated by using the corrected standard deviation of ρ , referred to as $SD\rho$, and they provide information on whether moderators are likely to be present. Whitener (1990, p. 317) recommends that if the credibility interval is small and does not include zero, then the mean corrected effect size is probably the estimate of a single population parameter and moderators are not in operation. However, if the credibility interval is sufficiently large or includes zero, then ρ probably represents the aggregate of several subpopulation means, each representing the operation of a significant moderator.

We calculated a homogeneity statistic Q for each analysis. A significant Q statistic supports the presence of moderators because it indicates that the residual variance is not homogenous (Hunter & Schmidt, 2004). Scholars have other tests available to them for the same purpose, including the test of whether a credibility interval includes zero, which was described above, and also the 75% rule with respect to the variance attributable to artifacts. Though we considered other tests, we decided to give priority to the use of the Q statistic because it provides the best balance between

TABLE 1
Meta-Correlations With the Different Measures and Dimensions of Performance

Stressors	k	N	r	SDr	ρ	SDp	95% Confidence interval		90% Credibility interval		% Due to artifact	Chi-square Q test
							Lower	Upper	Lower	Upper		
General performance												
Role ambiguity	114	22,258	-.20	.12	-.24	.12	-.21	-.16	-.44	-.04	32.79	376.35*
Role conflict	112	23,400	-.08	.11	-.10	.11	-.11	-.06	-.28	.08	39.77	290.44*
Role overload	40	8,298	-.06	.16	-.08	.18	-.10	.01	-.38	.22	18.34	232.48*
Work-family conflict	12	3,435	-.10	.10	-.12	.10	-.18	-.05	-.28	.05	33.59	37.77*
Job insecurity	11	2,912	-.14	.09	-.19	.08	-.17	-.10	-.34	-.03	50.51	21.67*
Environmental uncertainty	5	1,226	-.09	.18	-.11	.21	-.14	-.03	-.52	.30	12.91	40.80*
Situational constraints	8	1,915	-.19	.14	-.24	.15	-.29	-.05	.01	-.49	21.86	42.91*
Self-rated performance												
Role ambiguity	55	10,948	-.24	.11	-.30	.11	-.28	-.21	-.48	-.12	37.50	161.72*
Role conflict	52	10,860	-.07	.11	-.09	.11	-.10	-.04	-.31	.13	38.19	140.34*
Role overload	15	2,836	-.07	.16	-.08	.17	-.15	.04	-.36	.20	21.49	72.84*
Work-family conflict	6	2,186	-.13	.10	-.16	.10	-.23	-.04	-.01	.32	27.73	23.59*
Job insecurity	9	2,282	-.14	.09	-.18	.09	-.18	-.10	-.36	-.01	43.57	20.61*
Supervisor-rated performance												
Role ambiguity	51	9,001	-.15	.13	-.19	.13	-.18	-.11	-.41	.01	35.57	152.43*
Role conflict	49	8,989	-.10	.12	-.12	.11	-.13	-.06	-.30	.06	39.03	129.54*
Role overload	23	4,806	-.05	.17	-.06	.18	-.12	.04	-.36	.24	16.86	147.79*
Work-family conflict	5	1,105	-.04	.09	-.05	.06	-.17	.03	-.17	.06	62.18	8.14
Situational constraints	7	1,864	-.19	.14	-.24	.16	-.28	-.03	.02	-.50	19.85	41.9*

TABLE 1 (continued)

Stressors	k	N	r	SDr	ρ	SDp	95% Confidence interval		90% Credibility interval		% Due to artifact	Chi-square Q test
							Lower	Upper	Lower	Upper		
Role ambiguity	11	2,458	-.14	.08	-.17	.05	-.19	-.08	-.22	-.06	65.03	16.87
Role conflict	14	3,740	-.07	.08	-.08	.06	-.11	-.02	-.18	.02	53.74	26.26*
Role ambiguity	5	1,106	-.27	.14	-.34	.15	-.37	-.04	-.63	-.04	20.29	24.75*
Role conflict	5	1,106	-.20	.11	-.25	.11	-.27	-.02	-.46	-.03	36.07	13.93*
Role ambiguity	8	1,627	-.18	.18	-.22	.20	-.31	.00	-.55	.11	13.93	60.05*
Role conflict	9	1,981	-.13	.12	-.16	.12	-.21	-.02	-.40	.07	30.32	30.60*
Role overload	7	1,703	-.15	.13	-.16	.12	-.28	-.05	-.40	.07	23.89	29.75*

Note. k = number of samples, N = total number of individuals in the samples, r = mean weighted correlation, SDr = the standard deviation of the mean weighted correlation, p = true score correlation (after correcting both reliabilities and sampling error), SDp = standard deviation of the true correlation, lower and upper limits of 95% confidence interval, lower and upper limits of 90% credibility interval, % due to artifact = % of variance accounted for by sampling error and measurement unreliability.

* $p \leq .05$.

Type I error rates and statistical power (Cortina, 2003). When the Q statistic indicated that moderators were probably present, we examined whether the effect sizes were different across the subgroups within each category: Any nonoverlapping of the confidence intervals of the subgroups can be interpreted as providing support for the moderation hypothesis. Yet another approach, applied in our study, was to examine the between-class effect (Qb): If the categorical moderator fully fits the data, the between-class effect (Qb) is significant.

Meta-Analytical Regression Analyses

For testing the publication year moderating effect, we used meta-analytic regression analyses. We used weighted least squares (WLS; Neter, Wasserman, & Kutner, 1989) to estimate the continuous moderators, following Steel and Kammeyer-Mueller (2002), who found it the most accurate method, and because the dependent variable in the regression analysis is heteroskedastic. The weights were set equal to $n_j - 3$ where n_j is the sample size in sample j .

Results

As already noted, a total of 374 effect sizes from 104 published studies and 33 unpublished doctoral dissertations were available for analysis. The samples ranged from 23 to 1,005 employees and the mean sample size across all the samples was 209 employees ($SD = 157$). Furthermore, the majority of samples reported data from organizations located within English-speaking countries (88%). The response rate, reported in 100 studies, ranged from 15% to 100%, with a mean of 66% ($SD = 20.5$). The mean age of employees across the 72 samples in which age was reported was 36.5 years ($SD = 6$).

Main Effects

A summary of the overall relations between the various stressors and the different measures and dimensions of performance is presented in Table 1. The data in the table include the number of studies investigating each relationship (k), the total number of the individuals from these samples (N), the mean weighted correlation (r), the standard deviation of the mean weighted correlation (SDr), the estimated true correlation (after correcting for both reliabilities and sampling error; ρ), the standard deviation of the estimated true correlation (SDp), the lower and upper limits of the 95% confidence interval, the lower and upper limits of the 90% credibility interval, the percentage variance explained by artifacts, and the Q test.

Overall, the results supported Hypothesis 1. Specifically, as hypothesized, role ambiguity and situational constraints showed the highest correlations with performance. Role ambiguity's correlations with all the examined measures of performance were close or above $-.20$, as follows: general performance ($\rho = -.24$), self-rated performance ($\rho = -.30$), supervisor-rated performance ($\rho = -.19$), objective assessment of performance ($\rho = -.17$), quantitative assessment of performance ($\rho = -.34$), and qualitative assessment of performance ($\rho = -.22$). Similarly, situational constraints, which, because of insufficient data, were only examined in reference to general performance and supervisor-rated performance, showed a relatively high correlation ($\rho = -.24$) with both of these performance criteria. As hypothesized, the other examined work stressors showed weaker correlations with the different performance criteria.

Role conflict's correlation with general performance, self-rated performance, and supervisor-rated performance ranged between $\rho = -.08$ and $\rho = -.12$. Only in the case of quantitative assessment of performance ($\rho = -.25$) and qualitative assessment of performance ($\rho = -.16$) were the correlations higher. Concerning the association between role overload and performance, we had data on general performance, self-rated performance, supervisor-rated performance, and qualitative assessment of performance. In the first three categories, role overload's association with performance was low (ranged between $\rho = -.06$ and $\rho = -.08$) and not significant. The only significant correlation was between role overload and qualitative assessment of performance ($\rho = -.16$). Work-family conflict was modestly correlated with general performance ($\rho = -.12$) and self-rated performance ($\rho = -.16$). It also showed low and insignificant correlation with supervisor-rated performance ($\rho = -.05$). Job insecurity showed moderate correlations with the two performance criteria we tested: general performance ($\rho = -.19$) and self-rated performance ($\rho = -.18$). Finally, environmental uncertainty was modestly correlated with general performance ($\rho = -.11$). We also tested the first hypothesis using the Fisher z transformation (Meng, Rosenthal, & Rubin, 1992). Based on this test we found that for each of the performance measures, role ambiguity and situational constraints (when relevant) showed significantly higher correlations with the particular performance criterion than any of the other stressors ($p < .001$). Finally, concerning supervisor-rated performance, Viswesvaran et al. (1996) argued that the appropriate correction for measurement error is that based on interrater reliabilities. Thus, Viswesvaran et al.'s meta-analytical estimates of interrater reliability of supervisor ratings (.52) were used to correct correlations of supervisor ratings, giving the following results: The corrected meta-correlations of role ambiguity and role conflict with supervisor-rated performance were $\rho = -.24$ ($SD\rho = .16$) and $\rho = -.15$ ($SD\rho = .14$), respectively. In addition, the estimated true

correlations of role overload and work–family conflict with supervisor-rated performance were $\rho = -.07$ ($SD\rho = .24$) and $\rho = -.07$ ($SD\rho = .08$), respectively, and that of situational constraints with supervisor-rated performance was $\rho = -.29$ ($SD\rho = .16$). In sum, as hypothesized, role ambiguity and situational constraints were most strongly related to work performance, relative to the other work stressors.

Potential Moderators

Table 1 shows that for almost all meta-correlations the Q tests of heterogeneity are significant, that the credibility interval is wide and includes zero even though most effect sizes were significantly different from zero, and that the proportions of variance accounted for by sampling error and measurement unreliability are far below 75%. Thus, all three tests recommended in the literature (Hunter & Schmidt, 2004) are in agreement, indicating that the correlations are not homogenous and suggesting the presence of moderators. There is variability in almost all the stressor–performance relationships examined after the variance attributed to artifacts is taken into account. In the following section, we report on the results of our tests for the existence of moderators.

Job Level

Table 2 depicts the results of the moderator analysis by job level. With the exception of role ambiguity, role conflict, and role overload, none of the other stressors met the requirement of at least four studies per subset. Overall, the results showed significant differences between managers and nonmanagers in four of the nine cases examined. These differences tend to suggest that the relationship of role overload with performance is stronger among managers than among nonmanagers. Specifically, role overload–general performance effect size was significantly stronger among managers ($r = -.14$) than among nonmanagers ($r = -.07$). This pattern was also demonstrated in the relationship of both role overload ($r = -.12$ among managers and $-.01$ among nonmanagers) and role conflict ($r = -.15$ among managers and $-.07$ among nonmanagers) with self-rated performance.

Publication Year

In our regression analysis, we found that publication year had a significant negative effect on role ambiguity–general performance correlation ($\beta = -.20$, $\Delta R^2 = .04$, $p = .04$). However, the same effect in the case of role overload–general performance correlation was positive and significant

TABLE 2
Moderator Analysis by Job Level

Stressors	Managers						Nonmanagers						
	k	N	r	95% CI			k	N	r	95% CI			
				Lower	Upper	Q _w				Lower	Upper	Q _w	
				General performance									
Role ambiguity	18	2,451	-.20	-.21	-.19	68.32*	79	16,998	-.20	-.23	-.16	251.67*	3.83
Role conflict	15	2,017	-.13	-.18	-.09	19.84*	81	17,346	-.08	-.10	-.07	235.52*	4.49
Role overload	9	1,489	-.14	-.19	-.09	19.10*	21	4,284	-.07	-.10	-.04	141.57*	5.84*
				Self-rated performance									
Role ambiguity	9	1,135	-.30	-.35	-.25	28.94*	40	1,482	-.24	-.26	-.22	98.92*	4.72
Role conflict	7	1,027	-.15	-.21	-.09	16.42*	37	2,048	-.07	-.09	-.05	99.57*	6.70*
Role overload	4	745	-.12	-.19	-.05	14.54*	8	1,261	-.01	-.07	.05	17.31*	5.91*
				Supervisor-rated performance									
Role ambiguity	9	1,383	-.10	-.15	-.05	12.31*	33	5,773	-.17	-.19	-.14	121.63*	8.30*
Role conflict	8	1,057	-.10	-.16	-.04	3.60	32	5,712	-.12	-.14	-.09	103.65*	0.20
Role overload	6	866	-.12	-.19	-.05	12.76*	10	2,245	-.09	-.13	-.05	103.80*	0.52

Note. k = number of samples, N = total number of individuals in the samples, r = mean weighted correlation, CI = confidence interval, Q_w = Q test for homogeneity within classes, Q_b = Q test for homogeneity between classes.
*p ≤ .05.

($\beta = .40$, $\Delta R^2 = .15$, $p = .01$). The number of studies for the other stressors was insufficient to pursue an analysis on the effect of publication years.

Published Versus Unpublished Studies

As evident from Table 3, our results failed to support Hypothesis 2, which posited that published papers would report a stronger relationship between stressors and job performance than unpublished papers. In 6 of the 10 comparisons, the differences in the meta correlations between the two groups were not significant from each other. Moreover, the pattern of the observed differences between these correlations was not consistent. Of the remaining four comparisons, the correlations of role overload with general performance and self-rated performance in the published studies were significantly higher than the correlations between these variables in the unpublished dissertations. In contrast, role ambiguity showed significantly higher correlations with these two performance criteria based on the unpublished dissertations relative to the published studies. Therefore, we concluded that our second hypothesis was not supported.

Rizzo et al. Scale Versus Other Scales

The results described in Table 4 confirm that the type of stressor measurement used is a significant moderator. Both role ambiguity and role conflict had significantly lower correlations with performance when measured with the Rizzo et al. (1970) scale compared to all other scales, thus providing consistent support for our hypothesis in this regard. Moreover, these differences were also consistent along the different performance measures. For example, in the relationship between role ambiguity and general performance, studies using the Rizzo et al. scale had a significantly lower mean correlation ($r = -.18$) than did those measuring role ambiguity with other scales ($r = -.23$). Similarly, in the relationship between role conflict and general performance, studies using the Rizzo et al. scale had a significantly lower mean correlation ($r = -.06$) than did those measuring role conflict with other scales ($r = -.17$). Thus, it can be concluded that using the Rizzo et al. scale decreased the magnitude of both the role ambiguity and the role conflict correlations with the different performance measures compared to the other scales used.

Explorative Moderator Analyses

Following our finding that most of the effect sizes reported in Table 1 revealed heterogeneity across studies, indicating the need for moderator

TABLE 4
Moderator Analysis by the Instrument Used to Measure Role Ambiguity and Role Conflict

Stressors	Rizzo et al. Scale												
	95% CI					Other							
	<i>k</i>	<i>N</i>	<i>r</i>	Lower	Upper	<i>Q_w</i>	<i>k</i>	<i>N</i>	<i>r</i>	Lower	Upper	<i>Q_w</i>	<i>Q_b</i>
Role ambiguity	78	14,389	-.18	-.20	-.17	214.35*	22	4,615	-.23	-.25	-.20	63.86*	18.45*
Role conflict	81	16,316	-.06	-.08	-.04	144.61*	16	3,419	-.13	-.17	-.10	65.66*	34.00*
Role ambiguity	39	7,132	-.23	-.25	-.21	81.96*	9	2,044	-.25	-.29	-.21	19.21	13.02*
Role conflict	40	8,309	-.04	-.06	-.02	55.14*	5	1,018	-.13	-.19	-.07	29.39*	45.96*
Role ambiguity	34	5,799	-.14	-.16	-.11	93.66*	10	1,720	-.22	-.27	-.18	38.97*	9.94*
Role conflict	36	6,183	-.08	-.10	-.05	76.88*	7	1,402	-.15	-.20	-.09	28.05*	7.52*

Note. *k* = number of samples, *N* = total number of individuals in the samples, *r* = mean weighted correlation; CI = confidence interval, *Q_w* = *Q* test for homogeneity within classes, *Q_b* = *Q* test for homogeneity between classes.
**p* ≤ .05.

analyses, we conducted several explorative investigations of additional moderators, as reported below. We focused on moderators assessed as having the potential to contribute to future studies in this area.

English versus non-English speaking countries. As a general proxy for potential cross-cultural differences, effects were grouped by sample country origin into two categories: English-speaking countries versus all other countries.³ For role ambiguity, conflict, and overload relationships with the performance criteria we did not find evidence of a moderating effect of culture. For job insecurity there was a significant difference. Among the English-speaking countries, the relationships of job insecurity with both general performance and self-rated performance ($r = -.19$ and $r = -.22$, respectively) were double than those of the non-English speaking countries ($r = -.10$ for both general performance and self-rated performance).

Journal tier. We assessed the possible moderating effect of journal tier, expecting first-tier journals to show significantly higher effect sizes than second-tier journals. We culled the journals based on available prestige and impact ratings, defining as first tier the *Academy of Management Journal*, *Administrative Science Quarterly*, *Journal of Applied Psychology*, *Journal of Health and Social Behavior*, *Journal of Organizational Behavior*, *Journal of Management*, *Journal of Personality and Social Psychology*, *Organizational Behavior and Human Decision Processes*, *Psychological Bulletin*, and *Personnel Psychology* and as second tier all other journals. No consistent pattern was found for general performance or self-rated performance. However, the mean correlations of role ambiguity and role overload with supervisory-rated performance were significantly higher in the first-tier journals ($r = -.15$ and $-.16$, respectively) than the second-tier journals ($r = -.13$ and $-.01$, respectively), thus, providing support for our expectations.

Predictor reliability. We also compared studies that provided information on predictor reliability with studies that did not include this information, with the idea that this might be a proxy variable reflecting the methodological rigor of the study (Dudley, Orvis, Lebiecki, & Cortina, 2006). The results suggested that only studies providing information on role overload reliability demonstrated lower correlations as compared to studies that did not provide this information.⁴ We therefore concluded that our expectation was not confirmed.

³ A copy of the table with the full set of results for this moderator is available by e-mail from the first and second authors. Interested readers should specify the name of the moderator.

⁴ We are indebted to one of the anonymous reviewers of our manuscript for suggesting to us this idea.

Controlling for stressor intercorrelations. Knowing of the intercorrelations among role ambiguity, conflict, and overload, and assuming that the meta-correlations of any one of them with job performance may change relative to those reported in Table 1 when the other two are controlled for, we computed semipartial correlations between all three role stressors and general job performance. That is, we computed the correlation between role ambiguity and job performance, with conflict and overload partialled out; the correlation between role conflict and job performance, with ambiguity and overload partialled out; and role overload and job performance, with ambiguity and conflict partialled out. We found that the negative correlation between role conflict and job performance turned positive but still significant when role ambiguity and role overload were partialled out, indicating that this relationship is somewhat influenced by the other role stressors. Role ambiguity, in turn, was significantly and negatively related to job performance even when the effects of role conflict and overload were partialled out. Finally, the relationship between role overload and job performance remained insignificant even when role ambiguity and role conflict were partialled out.⁴ In sum, these results indicated that the relationships of role ambiguity and role overload with performance are robust.

Discussion

Summary of the Results

Our study provided a comprehensive review of the relations among stressors and job performance. For the seven types of stressors covered by our study, and for all the measures and dimensions of performance considered, all stressor–performance relationships were consistently negative. The magnitude of the estimated true correlations varied across the seven stressors (from $-.06$ to $-.34$). Moreover, on the basis of the customary rule of a 95% confidence interval that did not include zero, 20 out of the 24 effect sizes were significant. A major contribution of our study is the finding that almost uniformly across all performance measures, role ambiguity, and situational constraints, meta correlations with them were higher relative to the meta correlations of the five other stressors considered. Moreover, role ambiguity maintained its negative relation with performance even when role conflict and role overload were partialled out. This finding is congruent with transactional stress theory (Lazarus & Folkman, 1984), which regards role ambiguity as most detrimental to job performance. As suggested by a number of researchers (e.g., King & King, 1990), employees' lack of knowledge of what is expected of them hampers and constricts any purposeful effort on their part to attain

performance-related objectives. The high level of the negative relationship between situational constraints and performance was particularly striking. Jex (1998) postulated that “when organizational or job conditions make it more difficult for people to do their jobs, job performance would suffer” (p. 52). However, Villanova and Roman (1993) reported finding a very weak negative meta correlation of $-.05$ when they integrated past field research on this linkage. Hence, our study refines and extends their work, setting the record straight with respect to this stressor’s relationships with performance.

Job insecurity, which is a growing threat in the globalized economy, was shown to have a modest negative association with job performance. Nevertheless, we also found some evidence to suggest that the effect of job insecurity may be moderated by context. Thus, in studies from English-speaking countries, the relationships of job insecurity with both general performance and self-rated performance were double that from studies from the non-English speaking countries. It may be that this difference in relationships between job insecurity and performance in English versus non-English speaking countries stems from the fact that non-English speaking countries (e.g., primarily European countries) tend to provide their citizens more safety nets if they lose their jobs compared to English speaking countries. It will be helpful for future research to examine this proposition based on more direct measures of cultural and societal differences.

The number of primary studies focusing on the expected negative relationship between work–family conflict and job performance has grown substantially, allowing us to assess associations of this stressor with the different measures of performance. Our results suggest that work–family conflict has detrimental effect on work performance. It was negatively correlated with both self-rated performance and general performance. Our finding in this regard adds credence to a recent meta-analytical review that underscored the potentially negative effects of work–family conflict on general job performance (Allen et al., 2000). Although in this meta-analysis we tripled the number of studies exploring work–family and performance, we obtained the same results as Allen et al. (2000) did regarding general performance, the only measure of performance used by Allen et al. However, it is interesting that the relation between work–family conflict and supervisor-rated performance was weak and not significant. This may suggest that employees are aware that supervisors are not likely to be sympathetic to deterioration in their performance because of family-related matters. Therefore, it could be that these employees would try to maintain or increase their supervisory ratings by selectively focusing in their energy expenditure on those job behaviors appraised by their supervisors. We clearly need more research to study under

which contexts work–family conflict is more or less detrimental to work performance.

Of the four nonsignificant negative meta correlations obtained in our study (see Table 1), three concerned the stressor of role overload. As indicated in the introduction, it could be that in certain circumstances employees view role overload as a challenge, in this case it could be positively rather than negatively associated with job performance (LePine et al., 2005). In addition, role overload may consist of several dimensions, such as quantitative and qualitative role overload and job underload, that could be differentially related to performance (see French & Caplan, 1978 and Sutherland & Cooper, 2000).

Performance is a highly complex multidimensional construct, which can be measured in many ways. In this meta-analysis we examined for the first time quantitative and qualitative assessments of performance, which facilitated a more comprehensive understanding of the relationship between stressors and job performance. For example, we examined the relationships of role conflict and role ambiguity with quantitative and qualitative assessments of performance. The findings indicate a noticeably stronger relation between these two stressors and quantitative performance than qualitative performance, thus supporting the suggestion of Fried and Tiegs (1995) that future research on stressor–performance relationships could profit from assessing the relationships between stressors and specific dimensions of job performance.

Moderators

Our comprehensive meta-analysis generated new findings that concerned multiple moderators examined in our study. Our results indicated a stronger relationship of role conflict and role overload with performance for managers than nonmanagers. Future meta-analysis studies may benefit from exploring the difference in results between other professional and nonprofessional groups. We also found a positive effect of time of publication on the role ambiguity-general performance meta correlations, but a negative effect of time on role overload's correlations with general performance. This supports the importance of conducting future meta-analyses on the relation between work stressors and other outcomes to examine the moderating effect of publication year. In addition, similar to the results of other studies (Judge, Thoresen, Bono, & Patton, 2001; Thoresen et al., 2003) our results were essentially similar for published and unpublished studies for almost all the relationships in question. However, we used only dissertations in the category of unpublished studies. Future studies would benefit from examining all sources of unpublished results (including, e.g., unpublished conference papers) when comparing the results between

published and unpublished studies in the area of work stress and performance. Finally, consistent with other studies (MaGee, Ferguson, & Seers, 1989), we found that the use of the Rizzo et al. (1970) scales significantly decreased the magnitude of both the role ambiguity and the role conflict correlations with the different performance measures, as compared to all other alternative scales of these stressors. This finding suggests that researchers who continue to use the Rizzo et al. (1970) scales will likely weaken their ability to explain performance.

Reconciling Our Results With Previous Analytical Reviews

This meta-analysis represents the most wide-ranging quantitative review of the association between work stressors and job performance. As noted in the introduction, for five of the seven stressors investigated here, namely, role ambiguity, role conflict, job insecurity, work–family conflict, and situational constraints, we updated and refined previous meta-analytical reviews. In this section, we highlight the communalities and divergences between our meta-analytical results and those of previous quantitative reviews, which focused on these stressors (Allen et al., 2000; Sverke, Hellgren, & Naswall, 2002; Tubre & Collins, 2000; Villanova & Roman, 1993). Our results are not directly comparable with those of a recent meta-analytical inquiry by LePine et al. (2005) because their article reported only results based on the relationships of two clusters of work stressors to performance, clusters that were formed based on informed judges' assessments. Furthermore, LePine et al. (2005) consigned overload to one cluster and workload to the other without defining either.

The results of our study for the meta correlation of role ambiguity and general performance were similar to those of Tubre and Collins (2000), with $\rho = -.24, -.21$, respectively. In addition, our study and that of Tubre and Collins (2000) found comparable meta correlations of role ambiguity with self-rated performance, with $\rho = -.30, -.28$, respectively, and of role ambiguity with supervisor-rated performance, with $\rho = -.16, -.20$, respectively. The similarity could be related to the fairly large number of samples used in the two studies for these effect sizes. However, our study diverged from Tubre and Collins (2000) in the role ambiguity and objectively assessed performance meta-correlations, with $\rho = -.17, -.04$, respectively. A mirror image of this set of findings emerged when we compared our study with that of Tubre and Collins (2000) for the meta-correlations of role conflict with general, self-rated, supervisor-rated, and objectively assessed performance; the major divergence occurred with respect to the last-mentioned type of performance, with $\rho = -.08, .03$, respectively. This finding could be related to our basing our calculations

on twice as many samples as Tubre and Collins (2000): 14, in comparison to 7.

Sverke et al. (2002) reported a negative relationship between job insecurity and performance ($\rho = -.20$) with a 95% confidence interval that included 0, whereas using the same confidence interval, the negative meta correlation of $\rho = -.19$ found in this study was significant. A possible explanation for the relationship being significant in our study is that unlike Sverke et al. (2002) we decided to exclude articles that defined this stressor as satisfaction with job security (e.g., Stepina & Perrewe, 1991; Yousef, 1998), regarding it as a strain or a reaction to the stressor, and therefore our standard error was substantively lower than that reported by Sverke et al. (2002). Our finding concerning situational constraints was not consistent with that of Villanova and Roman (1993), who quantitatively reviewed the relationship between situational constraints and performance in field studies. They found a negative weak relationship with general performance in field studies ($\rho = -.05$), whereas in this study, the relationship of situational constraints and general performance was both significant and homogeneous ($\rho = -.24$). Again, the different criterion for selecting the articles for inclusion is a potential explanation for this inconsistency. For example, Villanova and Roman (1993) included articles where the stressor was not subjectively reported by the study participants but was assessed by informed judges like district managers (Steel & Mento, 1986; Steel, Mento & Hendrix, 1987), but we excluded these studies because we focused on perceived stressors. We do not discuss in details the meta-analysis conducted by Spector and Jex (1998), because they used two or three samples to examine the relationships between job stressors and job performance (Spector & Jex, 1998, p. 363). However, we should note that consistent with our findings, their scales of organizational constraints and interpersonal conflict had negative meta correlations ($-.11$ and $-.10$, respectively) with supervisor-rated performance, whereas their scale of quantitative overload had a positive meta correlation with performance (.16).

The modest negative mean correlation of work-family conflict with self-rated performance ($\rho = -.16$) and general performance ($\rho = -.12$) augments and extends Allen et al. (2000) findings ($\rho = -.12$), which were based on only four samples and related only to general performance. However, the relation between work-family conflict and supervisor-rated performance was found to be insignificant. We have discussed this finding earlier in the discussion. In brief, we suggest that these weak results between work-family conflict and performance may reflect the lack of legitimacy in the work environment for work-family conflict to affect performance. We further argue the need for future studies to further explore this issue.

Theoretical Contributions and Future Research Directions

From a theoretical perspective, these findings provide support for the model postulating that stressors are detrimental to job performance (Lazarus & Folkman, 1984), thus concurring with earlier quantitative and qualitative reviews of the relationships between work stressors and variables often used as proxies of organizational effectiveness and productivity, including absenteeism (Johns, 1997), counterproductive behaviors (Lau, Au, & Ho, 2003), accidents (Taylor & Dorn, 2006), and turnover (Griffeth, Hom, & Gaertner, 2000). However, our meta-analysis also provides evidence indicating that different stressors tend to have differential relationships with performance, and consequently, there is a need to further theorize and examine the causes for these differential relations. In our study we provided theoretical arguments in support of the differential relationships between different stressors and performance. However, there is a clear need for future research to further examine the circumstances, which contribute to the experience of stress, and the process by which employees combine and integrate threat and challenge appraisals in assessing a situational demand. Enhancing our understanding of the process of stress appraisal as combining and integrating challenge and hindrance appraisals would enable a more valid testing and a better understanding of the effect of a stressor on performance. For example, research should explore how the relative weight of perceived challenge versus threat in a given situation affects the individuals' experience of the situation as an opportunity or a threat. In addition, research would benefit from exploring the circumstances in which a situation is more likely to be perceived as a challenge or a threat. For example, role ambiguity may be perceived as a challenge in organizations that facilitate and reward involvement in new and challenging initiatives. In contrast, role ambiguity is more likely to be perceived as a threat in organizations that emphasize standardized operations and that reward performance based on the pursuit of well established processes and procedures. Individual differences, such as tolerance for ambiguity or need for clarity (Kahn et al., 1964), may also contribute to the experience of a challenge or a threat. Thus, individuals with high tolerance for ambiguity are more likely to perceive a potentially stressful situation as a challenge rather than a threat, compared to individuals with lower tolerance for ambiguity. Another example refers to role overload. It may be that role overload is perceived as more of a challenge when the organization is in a stage of growth and more of a threat when the organization is in a stage of decline.

Moreover, future research should also examine alternative avenues concerning the direction in which work stressors affect performance. One such avenue for future research to explore is the potential for curvilinear

relations between the different role stressors and performance. It may be that for some stressors (e.g., role ambiguity) the strongest relation with performance is linear in nature. On the other hand, for other role stressors (e.g., role overload), the strongest relation with performance is curvilinear in nature. In the latter case, it may be that individuals who are motivated to be involved in multiple tasks perform well until the number of tasks or their difficulty exceeds the individuals' capabilities or resources. In addition, the fact that all statistical indicators (Q test, credibility intervals, and proportions of variance accounted for by sampling error and measurement unreliability) support the presence of moderators should direct future research to systematically examine the effect of theoretically relevant moderators including those that we described in the introduction. One direction to follow may be to examine the interaction between and among different role stressors. As Fried, Ben-David, Tiegs, Avital, and Yeverchياهو (1998) proposed, it is possible that individuals are able to accommodate to one stressor at a time but will find it difficult to adjust and perform well in a situation in which two or more stressors are present at the same time. To test the possibility that stressors interact in affecting performance, researchers need to use individual-level data rather than the aggregated sample-level data used in this study.

Yet another direction for future research is to explore the effect of theoretically relevant moderators on the relations between particular role stressors and performance. For example, intolerance of ambiguity is a theoretically promising moderator of the stressor-performance relationship (Breugh & Colihan, 1994; Frone, 1990). Societal or organizational policies regarding treatment of unemployed individuals may be also used as moderators on the relationship between job insecurity and performance across different organizations and societies.

In addition, on the basis of available qualitative reviews in the literature (e.g., Bowers, Weaver, & Morgan, 1996; Jex, 1998), future research might examine the moderating role of situational variables not considered in this study (Payne, 1991, provides a list of possible candidates). Specifically, the stressor-performance relationship can be moderated by job control, which was assessed as a moderator by large number of studies (see Spector, 1998). Additional moderators may be social support and organizational commitment, and the personality traits of self-esteem and locus of control (Jex, 1998, pp. 69–90).

Moreover, there is a paucity of research exploring the motivational, behavioral, cognitive, and physiological mechanisms (mediators) through which role stressors affect performance. Thus, there is a need to theoretically elaborate and empirically investigate the mechanisms linking stressors with job performance. For example, potential cognitive and physiological mediators may raise theoretical questions: Is it the energy and

time expended by employees to cope with stressors or to deal with their negative affective reactions to stressors that account for the negative relationship? Does this mechanism also involve involuntary physiological responses to stressors that take their toll? Do these processes interact and, if so, in what fashion? Concerning motivational mediators, as Jex (1998) suggests, a stressor may affect performance by affecting antecedents of job performance such as the employee's commitment, motivation to invest effort, and motivation to maintain personal discipline. Emotional responses of employees to stressors such as emotional strain and job dissatisfaction may also serve as mediators (Fisher, 1980; Sullivan & Bhagat, 1992), and so are behavioral responses, which may include absenteeism (Gupta & Beehr, 1979), and involvement in work-related accidents that cause injury (Jones, 1990). Identifying specific variables that mediate the relationship between stressors and job performance could greatly improve our understanding of how stressors influence job performance.

Methodologically, our results provide evidence that support a cautious use of the stress measures of Rizzo et al. (1970) in primary stress research. Further, our results provide support for the utility of assessing the relationship between stressors and performance, based on self-report data (cf., Boomer, Johnson, Rich, Podaskoff, & Mackenzie, 1995). Unlike any previous meta-analytic inquiry, our study enables a systematic comparison of the relations of several stressors across several performance dimensions. There are widely accepted concerns that individuals' self-rated performances may contribute to invalid conclusions on the relationship between role stress and performance. These concerns are based on two alternative arguments. The first argument is that self-report measures of both the independent (stressors) and dependent (self-rated performance) variables may inflate the correlation between the two because of common method variance. The alternative argument is that because self-rated performance is associated with self-enhancing tendencies that lead to overrated performance and lower variability in performance scores (Dunning, Heath, & Suls, 2004), metacorrelations between self-rated performance and work stressors can be expected to be lower relative to objective or quantitative performance.

However, the results between the different role stressors and self-rated performance (as reported in Table 1) were for the most part similar or in the same direction to the results, which were based on supervisory ratings or objective performance data. This suggests that researchers and practitioners may obtain some useful information from self-report data on stress and performance.

Our findings have direct implications for the proponents of implicit stress theory who claim that the associations between supervisor-rated performance and stressors may be inflated due to the raters' beliefs that

employees working under stressful conditions are likely to perform more poorly than those not exposed to work-related stressors (e.g., Perrewe, Fernandez, & Morton, 1993; Westman & Eden, 1991). Thus, for example, Westman and Eden (1991, p. 136) argued that only by measuring performance objectively, in a manner that precluded any coloring of performance by stressors, could we avoid the threat of implicit stress theory to the validity of other-rated performance. Our analysis failed to support the implicit stress theory: As we have indicated, the meta correlations of quantitative assessments of performance with role ambiguity and conflict, which are presumably less susceptible to the threat of implicit stress theory, yielded effect sizes almost twice the magnitude of those of the corresponding meta-correlations of these two stressors with supervisor-rated performance. Therefore, our findings do not undermine the concurrent validity of supervisory ratings of performance.

Practical Implications and Limitations

From a practical perspective, the increasing levels of work-related stressors in advanced market economies have underscored the need for researchers to understand the performance implications of stressors, to predict the effects of novel workplace stressors, and to devise interventions designed to reduce the potential negative effects of stressors on job performance. Our meta-analytical review provides initial guidance for responding to these research challenges. The results suggest that organizations should give priority to stressors such as role ambiguity and situational constraints. For example, managers can provide adequate employee training that alleviates situational constraints (Jex, 1998). Moreover, role ambiguity can be reduced by leaders' establishing clearer goals, expectations, and evaluation criteria. Similarly, organizations should alleviate organizational constraints by establishing supportive work environments in which employees are given the necessary tools, technology, and information to function effectively.

Our findings therefore strongly support organizational stakeholders' preventive stress management interventions designed to increase organizational effectiveness and productivity. Although a recent meta-analysis (Van der Klink, Blonk, Schene, & van Dijk, 2001) found significant overall effects of stress-reducing interventions on strains and perceived quality of work life, the effects of stress interventions on individual performance and organizational effectiveness have hardly been investigated, partly because some managers adhere to implicit stress theories that relate stressors positively or curvilinearly to performance (Dewe & O'Driscoll, 2002). Therefore, educators of future managers may find it practical to propagate findings such as ours whose major import is that organizational

effectiveness and individual performance can be improved by endeavoring to reduce the stressors that employees perceive. Because the findings reveal relatively strong relationships of stressors with specific dimensions of performance, organizations may consider increasing the effectiveness of their performance appraisal systems by including in them several dimensions of performance like its quality and quantity. Constantly surveying the employees and learning which stressors are more prevalent and destructive to one's performance would enable organizations, together with their employees, to devise steps on how to minimize the adverse effects of these stressors on performance.

Like other meta-analyses, ours was based mostly on cross-sectional primary studies, which makes it impossible to assess the direction of causality (Deschamps, 1997; Spector, Dwyer & Jex, 1988). Another caveat concerns the number of samples used in each calculation of effect sizes in this study. Caution should be exercised in drawing conclusions from estimates based on small numbers of samples (Oswald & Johnson, 1998). Finally, it should be recognized that we limited our study to stressors, which are part of the category of work demands. Therefore, we did not study the effect of other variables such as job control (e.g., Stone, 1986), which are part of a broader category of work-related social-psychological stressors.

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