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Intolerance of ambiguity as a moderator of the occupational role stress–strain relationship: A meta-analysis

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Summary Occupational role stress has received increased attention in recent years. However, there have been few systematic efforts to review potential moderators of the role stress–strain relationship. The few narrative reviews that do exist conclude that the evidence for individual difference moderators is mixed and inconclusive. The purpose of this review was to utilize meta-analysis to determine whether intolerance of ambiguity represents a significant vulnerability factor in the role stress–strain relationship. Results indicated that intolerance of ambiguity does moderate the impact of role ambiguity. The implications of this finding for future job stress research and stress management programs are discussed.

Introduction

Interest in occupational role stress has grown considerably since Kahn, Wolfe, Quinn, Snoek and Rosenthal's (1964) classic study of role conflict and role ambiguity. In fact, Kahn *et al.*'s role episode model has stimulated three general streams of research. The first stream represents the examination of potential causal antecedents of role stress such as organization size, participation, communication, and group cohesion (e.g. Newton and Keenan, 1987; Schaubroeck, Cotton and Jennings, 1989; Schuler, 1979; Randolph and Posner, 1981). The second stream is composed of studies interested in the putative outcomes of role stress such as job satisfaction, tension, turnover, and organizational commitment (e.g. Dougherty and Pritchard, 1985; Kemery, Bedeian, Mossholder and Touliatos, 1985; Kemery, Mossholder and Bedeian, 1987; Schaubroeck *et al.*, 1989). Finally, the third stream represents efforts to identify variables (e.g. intolerance of ambiguity, organizational level, locus of control) that moderate the relationship between perceived role stress and its concomitant consequences (e.g. Lyons, 1971; Schuler, 1977; Keenan and McBain, 1979).

Recently, meta-analysis has been employed to summarize research examining the proposed antecedents and consequences of role conflict and role ambiguity (Fisher and Gitelson, 1983; Jackson and Schuler, 1985). These meta-analyses have convincingly shown that role ambiguity and role conflict are reliably related to several antecedent and consequent conditions. However, these same meta-analyses (Fisher and Gitelson, 1983; Jackson and Schuler, 1985) have also shown

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that there is significant between-study variability in the correlations between role ambiguity and role conflict, on the one hand, and a host of outcome measures, on the other. For example, Jackson and Schuler (1985) concluded that their results suggest 'that most of the relationships describing the potential ... consequences of role ambiguity and role conflict *are* likely to be influenced by moderator variables' (p. 44).

Although this conclusion supports, in principal, a major tenet of Kahn *et al.*'s (1964) role episode model, it is at odds with the results of narrative reviews examining the moderating effect of individual difference variables (e.g. Beehr and Newman, 1978; Van Sell, Brief and Schuler, 1981; White, 1978a,b). Narrative reviews have generally suggested that support for individual difference moderating variables is at best mixed and inconclusive. The lack of strong support for individual difference moderator effects, however, may be due to two factors (Frone and McFarlin, in press). First, past moderator research has typically been atheoretical or exploratory. Therefore, it has been difficult to put null and mixed results in context. For example, in the case of mixed results, one might ask if a theoretically relevant boundary condition is operating and, in the case of null results, one might wonder if the individual difference variable was truly a theoretically viable stress moderator.

Second, the lack of general support for individual difference moderator variables may result from an inability of narrative reviews to efficiently integrate effects across several studies (Cooper, 1979; Cooper and Rosenthal, 1980). For example, two narrative reviews (Roberts and Glick, 1981; White, 1978b) concluded that there was little support for the moderating effect of growth need strength on the job scope–outcome relationship. In contrast, two recent meta-analytic reviews (Loher, Noe, Moeller and Fitzgerald, 1985; Spector, 1985) provided strong support for the moderating effect of growth need strength.

Therefore, the present study employed meta-analysis in an attempt to clarify the moderating role of intolerance of ambiguity/need for clarity (IOA) on the role stress–strain relationship. IOA was examined in this review for several reasons. First, it was an important moderator of the role stress–strain relationship discussed in Kahn *et al.*'s (1964) original work. Second, subsequent models of job stress (e.g. Cooper and Marshall, 1976; Folkman, Schaefer and Lazarus, 1979; Ivancevich and Matteson, 1980; Matteson and Ivancevich, 1987) have also advocated its potential utility as a vulnerability factor in the occupational stress process. However, other job stress researchers (e.g. Beehr and Newman, 1978; Van Sell *et al.*, 1981; Jackson and Schuler, 1985) have suggested that the results concerning IOA are mixed. Finally, IOA moderator studies are still being conducted in an effort to 'clarify' its role as a potential stress moderator (e.g. Benson, Kemery, Sauser and Tankesley, 1985).

Intolerance of ambiguity has been defined as 'the tendency to perceive (i.e. interpret) ambiguous situations as sources of threat' (Budner, 1962, p. 29). The operational hypothesis in prior research has been that role stress (especially role ambiguity) and measures of strain are more strongly and positively related among high IOA employees than among low IOA employees. The rationale underlying this hypothesis is that when faced with an ambiguous situation, high IOA individuals appraise the situation as threatening. This appraisal of threat then presumably leads to negative outcomes such as feelings of tension and dissatisfaction, experience of somatic symptoms, and intentions to withdraw from the situation. It is important to note that while role ambiguity may seem to be the most likely source of role stress to interact with IOA, problems of task priorities posed by role conflict and role overload may also be a source of ambiguity in one's job role (Ivancevich and Matteson, 1980).

To briefly summarize, the purpose of this study was to extend the application of quantitative review procedures to the examination of stress moderator effects. More specifically, this review sought to offer a more definitive conclusion regarding the role of IOA as a stress moderator. It

was expected that the role stress–strain relationship would be stronger among high IOA employees than among low IOA employees. It is important to begin rigorous examination of proposed stress moderators because more definitive conclusions will help foster future refinements in job stress models and provide practitioners with valuable information concerning the individuals most likely to be vulnerable to particular stressors in the workplace.

Method

Sample of studies

The empirical articles reviewed were obtained as part of a larger literature review examining the role of intrapersonal characteristics as moderators of the occupational stressor–strain relationship. This literature review consisted of a three-stage search process. First, a computer search of both *Psychological Abstracts* and *Medline* data bases from the late 1960's to 1985 was conducted. Second, a detailed manual search of 53 journals in the areas applied psychology, social psychology, organizational behavior, health psychology, behavioral medicine, industrial medicine, and epidemiology was carried out. Each issue of each journal was searched from 1960 to 1985. Third, the reference section of obtained articles were searched for potential studies that might have been missed in the first two stages. No attempt was made to locate unpublished studies (e.g. dissertations, technical reports, etc.). However, a recent study by Harris and Rosenthal (1985) concluded that the problem of publication bias in terms of the magnitude of effect sizes may not be as great as originally thought.

The criteria for including studies in the present meta-analysis were: (a) the independent variable was a measure of role stress (i.e. role ambiguity, role conflict, role overload), (b) the dependent variable was a measure of individual (e.g. physical symptoms, job dissatisfaction) or job-related (e.g. performance, turnover) strain, and (c) intolerance of ambiguity/need for clarity was examined as a potential moderator of the relationship between (a) and (b). These selection criteria and search techniques uncovered a total of seven studies that provided 13 independent samples (see Table 1). With the exception of one study (Benson *et al.*, 1985) that employed moderated regression analysis, the remaining six studies each provided high and low IOA subsamples. IOA subsamples were formed in each study by dichotomizing the IOA scores at the median. If subgroup correlation analyses are to be performed, the use of median splits helps protect against spuriously inflated subgroup differences in effect sizes that might result from other procedures such as using the top and bottom thirds on the moderator variable.

Procedure

The exact procedures are described in more detail in the Results section below, therefore only a brief outline will be provided here. This review employed two separate meta-analytic techniques. The first technique was a variant of vote-counting called 'counting positive significant results' (CPSR: Hedges and Olkin, 1980). The second meta-analytic technique was effect size analysis as outlined by Rosenthal (Rosenthal, 1982, 1984; Harris and Rosenthal, 1985). Because these two statistical techniques assume independence of effects, correlations were averaged within studies (Hunter, Schmidt and Jackson, 1982) so that only one effect was submitted to any analysis. Within study averaging took place in the following circumstances. First, within study averaging was used to aggregate across multiple outcomes in a single study. Second, three studies (Ivancevich and Donnelly, 1974; Miles and Petty, 1975; Lyon and Ivanevich, 1978) subdivided

their sample according to organizational level/occupation type without hypothesizing that the magnitude, form, or direction of the IOA moderator effect should be different within these subsamples. Therefore, only results for the overall sample were used in order to provide a more powerful test of the IOA moderator hypothesis for each individual study. If overall results were not provided, the average effect for high and low IOA subgroups was calculated (Hunter *et al.*, 1982). Third, multiple indicators of a single construct (e.g. job satisfaction: satisfaction with esteem, supervisor, etc.) were averaged across to provide a single effect.

Results

Table 1 presents descriptive information on each of the seven IOA moderator studies. One fact readily apparent from Table 1 is that only one study (Keenan and McBain, 1979) tested whether IOA moderates the effect of a source of role stress other than role ambiguity. Thus, in order to maintain a high degree of interpretational clarity (e.g. Bangert-Drowns, 1986), role conflict and role overload were not incorporated into the meta-analysis. However, these results will be discussed in more detail in the Discussion section.

Vote-counting results

In CPSR, one compares the proportion of statistically significant ($p < 0.10$, one-tailed) and positive moderator effects to the proportion expected under the null hypothesis. A one-tailed test was used because an *a priori* directional hypothesis was being tested. A significant result indicates that IOA moderates the role ambiguity–strain relationship. As can be seen in Table 2, the vote-counting results lend strong support to the hypothesis that IOA moderates the role ambiguity–outcome relationship. After averaging across outcomes, 57 per cent of the studies found that the role ambiugity–strain relationship was stronger among high IOA employees than among low IOA employees. This conclusion was also corroborated when job dissatisfaction, job tension, and turnover intentions were examined separately. The strongest support for the IOA moderator hypothesis was found when job tension (80 per cent) represented the measure of strain. The weakest support was found for job dissatisfaction (43 per cent), while turnover intentions (67 per cent) fell in between.

Effect size analysis

The effect size analysis utilized each study that examined the role ambiguity–outcome relationship separately within low *and* high IOA subgroups (see Table 1). These subgroup correlations were used to calculate several statistics. First, sample correlations were used to calculate an overall, weighted effect size (Table 3, column 4) after aggregating across all outcomes and separately for each outcome examined in at least two studies (i.e. job dissatisfaction, job tension, and turnover intentions). Average correlations were not corrected for unreliability and restriction of range because the required reliability and variance estimates were not reported separately for high and low IOA subgroups. As can be seen in Table 3, role ambiguity is positively related to the aggregate outcome variable and each of the separate indicators of strain (mean rs = 0.07 to 0.53).

Second, combined standard normal deviates (Z) and their associated probability levels (obtained via the Stouffer method, Mosteller and Bush, 1954) were used to estimate the overall significance levels of the combined studies (Table 3, columns 5 and 6). These combined probability

Table 1. Studies examining moderating effects of intolerance of ambiguity/need for clarity

Study	Design	Sample	*N*	Relationship moderated			Moderator effect*	Subgroup correlations† High	Low
Benson, Kemery, Sauser and Tankesley (1985)	Cross-sectional	University employees	370	Role ambiguity	→	Job satisfaction	NS/MR	—	—
								(129)	(132)
Ivancevich and Donnelly (1974)‡	Cross-sectional	Manufacturing employees	261	Role clarity	→	Job interest	SIG/SGC	0.60	0.20
					→	Job innovation	SIG/SGC	0.60	0.17
					→	Job satisfaction	SIG/SGC	0.34	0.02
					→	Job tension	SIG/SGC	-0.64	-0.29
					→	Physical symptoms	SIG/SGC	-0.49	-0.24
					→	Turnover intentions	SIG/SGC	-0.65	-0.16
							(42)	(45)	
Keenan and McBain (1979)	Cross-sectional	Middle managers	90	Role ambiguity	→	Job satisfaction	SIG/SGC	-0.62	-0.28
					→	Job tension	SIG/SGC	0.48	-0.14
				Role Conflict	→	Job satisfaction	NS/SGC	-0.07	-0.24
					→	Job Tension	NS/SGC	0.14	0.24
				Role Overload	→	Job satisfaction	NS/SGC	0.08	0.03
					→	Job tension	NS/SGC	0.22	0.32

Table 1. (continued) Studies examining moderating effects of intolerance of ambiguity/need for clarity

Study	Design	Sample	N	Relationship moderated			Moderator effect*	Subgroup correlations† High	Low
								(83)	(79)
Lyon and Ivancevich (1978)‡	Cross-sectional	Hospital Staff	162	Role clarity	→	Job satisfaction	NS/SGC	0.16	−0.03
					→	Job tension	NS/SGC	0.26	0.19
					→	Turnover intentions	NS/SGC	0.10	0.03
								(83)	(79)
Lyons (1971)	Cross-sectional	Nurses	156	Role clarity	→	Voluntary turnover	SIG/SGC	−0.35	0.00
					→	Turnover intensions	SIG/SGC	−0.45	−0.01
						Job satisfaction	SIG/SGC	0.54	0.20
					→	Job tension	SIG/SGC	−0.69	−0.40
								(75)	(76)
Miles and Petty (1975)‡	Cross-sectional	Scientists and engineers	152	Role clarity	→	Job tension	SIG/SGC	−0.43	−0.14
					→	Job satisfaction	NS/SGC	0.57	0.47
								(33)	(35)
Stead and Scamell (1980)	Cross sectional	Librarians	68	Role ambiguity	→	Job satisfaction	NS/SGC	0.07	0.24

*NS=Not Significant, SIG=Significant Subgroup difference ($p<0.10$, one-tailed), MR=moderated regression, SGC=subgroup correlation test.
†Numbers in parentheses are subgroup sample sizes.
‡These effect sizes are the result of within study averaging.

Table 2. Vote-counting results for moderator effect of intolerance of ambiguity/need for clarity on the role ambiguity–outcome relationship

Dependent variable	Proportion of Significant interactions	Z	One-tail probability
All outcomes combined	(4/7)=0.57	4.27	0.000010
Job dissatisfaction	(3/7)=0.43	3.00	0.001350
Job tension	(4/5)=0.80	5.38	<0.000001
Turnover intentions	(2/3)=0.67	3.35	0.000404

The proportion of significant and positive interactions were tested against the expected proportion of 0.10.

levels indicated that, with the exception of the role ambiguity–turnover intention relationship for low IOA employees, the positive relationships between role ambiguity and the outcome variables were not due to chance.

Third, the sample correlations were used to calculate a chi-square test of homogeneity of effect sizes and its associated probability level (Table 3, columns 7 and 8). A significant chi-square indicates that the between-study variability in effect sizes cannot be solely attributed to sampling error, thus a potential moderator variable such as IOA may be operating. As can be seen in Table 3, for each of the dependent variables, the chi-square test for the total sample was highly significant, indicating that a significant moderator may be present. It should be noted that the present findings regarding effect sizes and effect heterogeneity for the total sample compare favorably with the Fisher and Gitelson (1983) and Jackson and Schuler (1985) results concerning the main effect of role ambiguity on job satisfaction, job tension, and turnover intentions.

Fourth, because the tests of homogeneity for the full sample suggested that variance among the sample correlations was not completely explained by sampling error, a z-test was employed to determine whether the average effect sizes for high and low IOA subgroups were significantly different from one another (Table 3, columns 9 and 10). As noted in Table 3, the z-tests were highly significant. These results corroborate the vote-counting results by showing that the positive correlation between role ambiguity and strain is significantly stronger among high than among low IOA employees.

Finally, Table 3 (Columns 7 and 8) indicates that, with the exception of job dissatisfaction, tests of heterogeneity of effect sizes were non-significant in the low IOA subgroup. However, there was a significant amount of heterogeneity among correlations in the high IOA subgroup. This last finding indicates that the mean effect sizes for high IOA employees may not be very stable and that another moderator variable(s) may be operating in this group.

Discussion

The present results lend strong support to the moderating effect of IOA on the role ambiguity–outcome relationship. More specifically, the positive relationship between role ambiguity and indices of strain is substantially stronger among high than among low IOA employees. This conclusion contradicts narrative summaries (e.g. Van Sell *et al.*, 1981; Jackson and Schuler, 1985) that suggest the findings are mixed. However, these prior reviews only examined a few IOA moderator studies and did not attempt to apply meta-analytic techniques to help resolve this issue.

Table 3. Effect size analysis for moderator effect of intolerance and ambiguity/need for clarity on the role ambiguity–outcome relationship

Dependent variables	No. r	Combined N	Weighted Combined Mean r	Z Value	Prob.	X^2	Prob.	Z*	Prob.
All outcomes combined	12	869	0.29	7.53	<0.000001	53.86	<0.000001	2.84	0.002256
High IOA†	6	440	0.40	7.55	<0.000001	38.00	<0.000001		
Low IOA	6	429	0.16	3.61	0.000153	5.96	0.310131		
Job dissatisfaction	12	869	0.29	8.05	<0.000001	44.38	0.000006	2.95	0.001589
High IOA	6	440	0.40	7.88	<0.000001	22.74	0.000378		
Low IOA	6	429	0.16	3.51	0.000224	13.41	0.019825		
Job tension	10	801	0.40	10.34	<0.000001	45.33	0.000001	4.31	0.000008
High IOA	5	407	0.53	10.03	<0.000001	18.32	0.001068		
Low IOA	5	394	0.24	4.59	0.000002	3.72	0.445224		
Turnover intentions	6	563	0.26	4.89	<0.000001	58.90	<0.000001	3.81	0.000069
High IOA	3	290	0.42	5.97	<0.000001	37.60	<0.000001		
Low IOA	3	273	0.07	0.95	0.171056	2.04	0.360595		

All probabilities are one tailed.
*This z statistic tests whether the mean correlation for high versus low moderator subgroups are significantly different.
†IOA refers to intolerance of ambiguity.

It is important to note, however, that the conclusion regarding the moderating effect of IOA needs to be tempered somewhat due to several potential methodological weaknesses in the empirical studies that were the focus of this review. First, the studies used cross-sectional and self-report methods exclusively. Therefore, their findings and the conclusions of this review may be vulnerable to reverse causation and method variance explanations. Recent research (Spector, 1987; Spector, Dwyer, & Jex, 1988) has suggested, however, that method variance is not an invariant attribute of self-report methods. Thus the use of method variance as an alternative explanation should not be invoked reflexively. Also, it is unlikely that method variance can create a *particular* pattern of interaction between several variables. Second, IOA moderator studies have generally used only indices of psychological strain. Hence, it is unknown whether conclusions derived from these studies will generalize to a variety of physiological or behavioral strain measures. However, there is evidence suggesting that this effect may generalize to somatic symptoms (Ivancevich and Donnelly, 1974) and voluntary turnover (Lyons, 1971).

Despite the potential methodological limitations noted above, the results of this review point to several interesting implications for future research and stress management. First, future research should employ longitudinal designs coupled with objective measurement of both the person and environment in an effort to more forcefully rule out alternative explanations such as reverse causality and method variance.

Second, future research on IOA should incorporate stressors other than role ambiguity and outcomes that represent behavioral and physiological dimensions of strain. There is evidence suggesting that IOA may *not* moderate the impact of role conflict and role overload (Keenan and McBain, 1979, see Table 1). This result suggests a *moderator/stressor matching hypothesis*. More specifically, individual difference variables may not have generic power to moderate any stressor–strain relationship, rather there may need to be a conceptual fit between a stressor and moderator before any person–environment interaction is realized. This conclusion should be regarded as speculative and empirically tested in future research because only one study used a role stressor other than role ambiguity. Furthermore, a broader assessment of strain would provide additional information concerning the generalizability of the IOA moderator effect.

Third, future research should examine the role of cognitive appraisal (e.g. Folkman *et al.*, 1979; Lazarus and Folkman, 1984) as a mediator of role ambiguity by IOA interaction on indices of strain. After all, the rationale implicit in past research on IOA is that high IOA individuals appraise ambiguous situations as threatening (e.g. Budner, 1962). To date, however, there have been no attempts to assess underlying process variables. Two recent articles have discussed the statistical considerations inherent in testing such mediating processes (James and Brett, 1984; Baron and Kenny, 1986).

Fourth, other moderators of the role stress–outcome relationship should be considered, especially among high IOA individuals. For example, high IOA employees may be no more vulnerable to ambiguity than low IOA employees if their level of job involvement is low (Frone and Major, 1988). Also, additional moderators that may prove useful are intolerance of conflict or overload. Posner and Randolph (1980), using a strategy similar to the one employed in IOA studies, tested whether their newly developed measure of intolerance of conflict moderated the role conflict–strain relationship. However, Posner and Randolph failed to find a significant moderator effect when trying to predict three indices of strain (job satisfaction, individual performance, and perceived unit effectiveness). Given the methodological problems in this study (e.g. new unvalidated measure of intolerance of conflict, relatively small sample, and limited measures of strain), coupled with the positive results reported for IOA, the idea of testing intolerance of conflict should receive further attention.

Finally, in terms of stress management, the present findings suggest that all employees are not equally vulnerable to role ambiguity. However, because IOA is presumably a relatively stable personality trait (Budner, 1962), it is unlikely that an employee's level of IOA will be easily changed. Therefore, stress management strategies should attempt to reduce an employee's exposure to high levels of role ambiguity. Such an approach is consistent with recent arguments that improving the work environment may be a more desirable and more ethical stress management strategy than the usual employee inoculation approach (e.g. Beehr and O'Hara, 1987). One strategy to reduce role ambiguity is to increase employee participation in decision-making (Jackson, 1983). In general, participation can keep management informed about the existence of role stressors and give employees some power to combat them. However, participation must be desired by employees. If it is not desired, forcing it may create an additional person–environment misfit.

Another way to combat the effects of role ambiguity is to place vulnerable individuals into positions that minimize exposure to this stressor. This may be accomplished by incorporating measures of IOA into the employee selection process or by sensitizing managers to the influence of IOA. Concerning this last strategy, Matteson and Ivancevich (1987) noted that 'most managers do not think consciously about a subordinate's tolerance for ambiguity. But it is also true that most managers *have* that information and simply do not think about it. A manager knows how much direction a particular employee needs, how much information he requires, how well he reacts to new and different work situations or departures from routine, and how challenged or threatened he is by change. Knowing these things, a manager knows a great deal about his employee's tolerance for ambiguity' (pp. 91–92). Given this knowledge, managers may be able to assign employees to tasks in such a way that their level of IOA is taken into account.

In general, the use of employee selection and management education programs as stress management tools is limited by our current level of knowledge concerning stress moderators. Although this review attempted to highlight what is known about IOA, more primary and meta-analytic research is needed before comprehensive stress management programs can be developed.

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