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ABSTRACT

Job stress is recognized as a primary roadblock to achieving job satisfaction. In order to investigate the linkage between important job characteristics and stressor levels, 378 factory supervisors (aged 45-54; 89 percent male; 93 percent white with an average of 21 years with the company) completed a two-part job analysis questionnaire. In the first part, supervisors identified and assigned time allocations to the crucial tasks, knowledge areas, skills, abilities, and demands of their jobs. In the second part, the occurrence of four stressors (role ambiguity, role conflict, responsibiltiy for people, and quantitative work overload) were rated on a five-point scale. An analysis of the results showed that a direct link did exist between perceptions of specific job characteristics and high stressor levels. Role ambiguity and conflict were most frequently related to providing knowledge to incumbents, organizational procedures, and interfacing with other people. Responsibility to people was stressful in terms of financial duties. Work overload stress related to pressure and pace of work activity. The direct application of these findings focus on stress management programs which deal with reducing stressor levels and not just with alleviating individual strains. (Demographic and analytic tables are appended). (BL)

Using Job Analytic Perceptions to Predict Stressor Levels Among Factory Supervisors

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Running Head: Using Job Analytic

Abstract

The linkage among perceptions of the important aspects of the job of factory supervisor and reported stressor levels was empirically demonstrated. Factory supervisors (n=378) provided job analysis data and ratings on four job stressors: role ambiguity, role conflict, responsibility for people, and quantitative work overload. Task factor ratings, KSA factor ratings, and job demand factor ratings significantly predicted job stressor levels. The implications for data-based stress management programs for factory supervisors were considered.

For most adults who are employed, their work represents a time commitment which is exceeded by no other event in their everyday life. According to commonly held beliefs within our society regarding work, our jobs should bring satisfaction, should improve the quality of our lives--both economically and psychologically--and should allow time for leisure activities. The increased attention to job stress management, quality of work life, and wellness programs within corporations throughout the country suggests that many of our jobs are not meeting these goals.

Emphasis on Job Stress Research

There has been an increase in both professional and popular opinion that job stress is a primary roadblock to achieving many of these worklife goals. Given the potential economic, psychological, and physiological costs of job stress this opinion is well founded (Ivancevich & Matteson, 1980). In recent years several major reviews of job stress research have provided descriptions of the elements of job stress. These descriptions produced a model under which much of our current job stress research has been conducted (e.g., Beehr & Newman, 1978; House, McMichael, Wells, Kaplan & Landerman, 1979). According to these reviews job stress consists of (a) stressors -- job-related characteristics which are causal in nature and (b) strains -- individual health characteristics (including psychological facets) that are thought to be consequences.

Based on these descriptions of the elements of job stress many studies have attemped to link the causal elements (stressors) with the consequences (strains). For example, it has been shown that stressors of a psychosocial orientation -- role ambiguity, role conflict, responsibility for persons, and work overload -- are significantly related to increased reports of strain in

individual employees -- decreased job satisfaction, increased anxiety, increased somatic complaints (e.g., Beehr, Walsh & Taber, 1976; Chassie & Bhagat, 1980; Ford & Bagot, 1978). Thus, in many instances these stressor-strain links have been empirically demonstrated.

Application of Stressor-Strain Relationships in Stress Management

The assumptions of the stressor-strain approach to job stress research have surfaced in many of the stress management programs currently being implemented in organizations. Ranging from exercise programs to biofeedback training to progressive relaxation techniques, the focus of these stress management procedures is to teach the individual worker how to cope with the strains being experienced. The goal of these methods is to reduce the impact of individual stressor-induced ailments.

Love and Beehr (1981) have argued, however, that without empirical data documenting the effectiveness of these programs the choice and implementation of a certain stress management procedure cannot be wholly rational. Moreover, without a focus on reducing the causal factors (high stressor levels) the coping strategies taught to individual workers will be at best temporary treatments. For example, if an individual loses effectiveness in progressive relaxation due to lack of practice the high stressor levels which have remained in place will reinstate the same high strain levels.

Linking Stressor Levels with Job Characteristics -- The Present Study

In order to pinpoint specific causal factors of individual strains within a particular job, linkages must be demonstrated among stressors and perceptions of important job characteristics for an individual employee. Similarly, linking perceptions of core job dimensions with psychological states

(other than stressor levels) has been demonstrated by Hackman and Oldham (1975; 1976). Through application of their Job Diagnostic Survey levels of job involvement were significantly related to employee motivational states.

Personnel psychology has emphasized the utility of identifying important job characteristics in the development of personnel systems (see Cascio, 1982). Through job analysis procedures the tasks, knowledges, skills, abilities, and job demands important for success in a specific position can be identified. As measures of core job dimensions, ala Hackman & Oldham (1975; 1976), job analysis information should be related also to certain psychological states.

The present study sought to provide empirical documentation of the linkages among important job characteristics and stressor levels. Past research has provided information indicating relationships among organizational variables such as structure, organizational environment, interpersonal perceptions, etc. with role conflict and role ambiguity (Moch, Bartunek & Brass, 1979; Morris, Steers & Kock, 1979; Nicholson & Goh, 1983). These studies, however, have not utilized job analysis procedures in determining important job characteristics through which job-stressor relationships can be identified.

It was hypothesized that various stressors could be "defined empirically" through linkages with perceptions of important job characteristics. That is, each stressor measured (i.e. role ambiguity, role conflict, responsibility for people and work overload) would be empirically defined through its relationships with particular job characteristics.

Method

Subjects

The study involved job analysis and stressor measures gathered from 378 factory supervisors. The typical factory supervisor was a white male between 45-54 years of age. Having attained a high school degree and accumulation of more than 21 years with the organization were common characteristics. The typical supervisor worked first shift within a production/assembly department. More detailed information regarding sample characteristics is presented in Table 1.

Insert Table 1 about here

Procedure

Job analysis. In order to identify the important aspects of the job of factory supervisor within the subject organization, a task-based job analysis was completed (see McCormick, 1976). Using data collected from interviews with selected job incumbents, a questionnaire was developed which requested information regarding the crucial tasks, knowledges, skills, and abilities (KSA's) and job demands for factory supervisors.

For each task listed on the questionnaire the incumbent provided two ratings using anchored five-point scales: time spent compared to other tasks and criticality to performance. For each KSA incumbents provided a five-point importance rating. Each job demand was evaluated using a four-point scale, with anchors, as to its descriptiveness of the job of factory supervisor within the subject organization.

Task, KSA, and job demand factors. Those tasks with a composite rating (averaged across time spent and criticality ratings) of 2.5 or greater were entered into a factor analysis. A similar 2.5 cutoff level was used for entering the KSA importance ratings into a factor analysis. All job demand ratings were entered into a factor analysis. For all factor analyses orthogonal rotation with iterations was used. The resultant task factors, KSA factors, and job demand factors are shown in Table 2.

Insert Table 2 about here

Organizational context of factory supervisor job. As part of the job analysis questionnaire the incumbents provided information regarding the scope of their current position as it related to the overall organization. Table 3 presents a profile of the scope of the factory supervisor position within the subject organization. Specifically, the typical supervisor job involved interaction with persons within the organization, supervision of 11-50 subordinates, and responsibility for a budget of between $100,000 and $500,000. The typical supervisor had previously held either a group leader or technical position within the organization before assuming the factory supervisor job.

Insert Table 3 about here

Stressor measurement. As the final section of the job analysis questionnaire factory supervisors rated the occurrence of four stressors, using a five-point scale: (1) role ambiguity -- defined as the extent to which role

incumbents understand their job duties, rights, and responsibilities -- four items were extracted from the scale developed by Rizzo, House, and Lirtzman (1970); (2) role conflict -- defined as the degree of incongruity or incompatibility of expectations -- four items were taken from the Rizzo et al. (1970) scale; (3) responsibility for people -- described as having control over the welfare of others, notably subordinates -- five items were adapted from Ivancevich and Matteson (1980); and (4) quantitative work overload -- seen as having more work than can be accomplished within a given time period -- five items were adapted from the scale developed by Ivancevich and Matteson (1980).

These stressors were shown previously to be causes of several strains (see Beehr & Newman, 1978). A composite score was calculated for each stressor, averaging ratings across related questionnaire items. The average stressor levels for the factory supervisors (shown in Table 4) were beyond the mid-point of each stressor rated.

Insert Table 4 about here

Results

Linear Regression Analyses

The four stressors, as measured in the present study, were found to be independent (see Table 5). Linear regression analyses were computed to

Insert Table 5 about here

investigate the relationship among important job characteristics, (i.e., task factors, KSA factors, and job demand factors) and stressor levels (i.e., role ambiguity, role conflict, responsibility for people and work overload). For each stressor (dependent variable) three separate linear regression analyses were performed on the data using task factor ratings, KSA factor ratings, and job demand factor ratings as separate sets of predictors (independent variables). Simultaneous entering of all predictors was employed for all of the 12 linear regression equations calculated. As hypothesized, perceptions of specific job characteristics were linked to high stressor levels, across all four stressors.

Stressor-Job Characteristic Relationships

Role ambiguity and role conflict were most frequently found to have a significant relationship with specific job characteristics. There was little overlap in the job characteristics significantly related to either role ambiguity or role conflict. Consistent with the arguments provided by Nicholson and Goh (1983), role conflict and role ambiguity had substantially different implications for relationships with job analysis perceptions. Whereas role conflict was interpreted as an incompatibility among tasks, resources, policies, or people, role ambiguity involved uncertainty and lack of clarity regarding role requirements for the individual employee.

Role ambiguity. Specifically, those job characteristics significantly related to role ambiguity were reject/defect operations, maintaining personal expertise, team activities, documentation of worker problems, labor relations knowledge, packing and shipping knowledge, product knowledge, prints, specification, and charts knowledge, accounting knowledge, solid state knowledge,

and the physical requirements of the work (see Table 6). Most areas of the job of factory supervisor significantly related to levels of role ambiguity involved rating as important knowledges needed by the incumbents to perform within their required role. Moreover, several important areas involved potential lack of clarity regarding organizational procedures (e.g., documentation of worker problems, reject/defect operations).

Insert Table 6 about here

Role conflict. For role conflict the significant relationships indicated a direct confrontation among people and procedures (see Table 7). Specifically, role conflict was significantly related to the pressure and pace of work activity, salvage/scrap operations, interface with purchasing, obtaining maintenance for department, scheduling operations. overseeing production, employee counseling, maintenance knowledge, and making adjustments to personal life. Most of these important job characteristics involved interfacing with other people within or outside of the supervisor's department.

Insert Table 7 about here

Responsibility for people. There was a degree of overlap among job characteristics seen as indicative of role ambiguity and responsibility for people. As Table 8 shows, most of the job characteristics significantly related to levels of responsibility for people involved areas of the job of factory supervisor which had direct bearing on employee concerns. The pressure and pace of work activity, budget operations, team activities, packing and shipping knowledge, product knowledge, accounting knowledge, solid state

knowledge, the physical requirements of the work, and employee administrative activities were related to levels of responsibility for people. It is interesting to note the number of important areas involved with financial duties of the factory supervisor which relate to levels of responsibility for employees.

Insert Table 8 about here

Work overload. Level of work overload (see Table 9), as seen by the factory supervisors, was related to the single job demand of pressure and pace of work activity. Defined as too many things to be done, with not enough time for completion, this relationship was almost intuitive.

Insert Table 9 about here

Discussion

Defining Stressors Through Job Characteristic Linkages

As hypothesized, each stressor (i.e., role ambiguity, role conflict, responsibility for people, and work overload) was "defined empirically" through significant relationships with important job characteristics. These empirical definitions coincided with several of the definitions of these variables stated in past research (i.e., House, McMichael, Wells, Kaplan & Landerman, 1979; Nicholson & Goh, 1983).

Role ambiguity was empirically defined by its link with many knowledge areas which were seen as important aspects of the job and lent themselves to a clear and unambiguous understanding of the job of factory supervisor. The

more the supervisor reported knowledge areas as important in the job the more likely high levels of role ambiguity were evidenced.

Conflict among organizational departments and individuals was seen as crucial to successful completion of the job and empirically defined this stressor for the factory supervisors. Interfaces with organizational units such as the purchasing and maintenance departments were quite important to the supervisors and a potential source of job stress. The factory supervisor portrayed themself as the person who must coordinate many individuals and entire departments to satisfactorily complete their job duties.

Responsibility for people indicated a concern on the part of the factory supervisors for the impact of many budget and financially related items upon their employees. That is, the supervisors reported responsibility for the financial soundness of their units as a very important part of their job which was directly related to their responsibility for their employees. Perhaps as a statement of current economic conditions, financial matters were seen as a primary influence on the well being of subordinates.

Work overload, a common complaint (see Beehr & Newman, 1978), was related to the single job characteristic pressure and pace of work activity. This verified the frequently stated definition of this stressor.

Implications for Stress Management For Factory Supervisors

The direct application of the study findings focus on development of stress management programs which deal with reduction of stressor levels, not only individual strains. Through the linkages established with job characteristics for factory supervisors, recommendations are apparent for stressor reduction:

(1) For reduction of role ambiguity within factory supervisors, increased knowledge gained through training or formal education is suggested. Clarification of the role of factory supervisor could be improved with increased perceptions that the supervisors had increased expertise in crucial areas;

(2) An organizational intervention program, such as conflict management, is suggested for reduction of role conflict. The importance of managing interfaces with various organizational units was highly related to levels of role conflict. An intervention program which involves conflict management among these groups or actual organizational restructuring would assist the factory supervisors in attaining positive interactions thus reducing this stressor;

(3) The present study identified financial concerns as significantly related to levels of responsibility for people. The importance attached to these financial concerns may be a statement of the current economic-recessionary conditions. While solution of the nation's economic woes is a larger task than most organizational interventions, the findings suggest that the budgeting and resource allocation systems be examined. It is possible that changing the accounting procedures may impact on a more cost effective allocation of scarce resources. Moreover, the competitive budget allocation system built into many organizations (i.e., supervisors compete for a piece of a pool of limited resources) may increase this stressor. In any case, the supervisors were quite in tune with the impact of financial matters on their employees;

(4) While the perception of work overload probably cannot be completely dispensed, it should be noted as an indication of potential job stress. That is, the pressure and pace of work activity may be manipulated to ease these stress-related perceptions.

Impact of Using Job Analytic Perceptions in Stress Research

Data-based stress management. Reduction of the causal factors of job stress for factory supervisors is more cost effective than continual alleviation of individual strains through teaching of individual coping strategies. This orientation, however, is opposed to the traditional clinical or medical model of individual health treatment. The methodology employed in the present study goes beyond individual diagnosis and analysis to group measures. While the individual is not ignored, the major thrust is the identification of job perceptions and stressor levels for the majority of job incumbents.

The clinical or medical model of health treatment usually takes the approach of diagnosing the individual and fitting that person into the appropriate treatment mode. Taking the job duties, organizational structure, and business realities as given, the individual would be changed to fit within the existent environment.

Regardless of one's orientation, the data indicate that specific job characteristics seen as important in the job of factory supervisor are linked to levels of various stressors. To maximize reduction of stress levels remediation of the stressors is suggested across job incumbents using the job analytic perceptions as guides to program development.

Extending job characteristic-psychological state research. The usefulness of job analysis data has been well documented (see Cascio, 1982). Primarily, however, the utility of job analysis data has been measured in the application of such information to the development of personnel systems. The present study has opened a new door with regard to another application of job analysis data. That is, job analysis data which involves worker perceptions of the

importance of various tasks, KSA's and job demands is indicative of stressor levels (i.e., psychological states) for job incumbents. While the present study focused on four stressors, future research may identify other psychological characteristics which can be predicted from perceptions of job characteristics.

In addition, future research is needed to extend the methodology used in the present study to other positions. While the position of factory supervisor is found among many different types of organizations, there may be significant differences in the relationships among job characteristics of nonsupervisory jobs and stressor levels. Moreover, it has been suggested (Sasser & Leonard, 1980) that the factory supervisor's job (i.e., first line supervisor) is unique when compared to higher level managerial roles. Replication of the present study methodology and measurement would identify not only differences in important job characteri s among positions, but the frequency of high stressor levels among a variety of occupations.

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Footnotes

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Table 1

Factory Supervisor Job Analysis Participants

Variable	% of Supervisors
● Sex	
- Male	89
- Female	11
● Race	
- Black	4
- Caucasian	93
- Spanish Surname	1
- American Indian	0.5
- Other	1
● Age	
- Under 25	.05
- 25-29	1
- 30-34	9
- 35-39	13
- 40-44	19
- 45-49	21
- 50-54	21
- 55 or over	15
● Education	
- Less than high school	3
- High school	46
- Some college	38
- Associate or 2 year degree	8
- B.A.	3
- Some graduate school	2
- Masters degree	—

Table 1 (cont.)

Factory Supervisor Job Analysis Participants

Variable	% of Supervisors
• Tenure with organization	
- 1 to 2 years	1
- 3 to 4 years	4
- 5 to 10 years	10
- 11 to 20 years	32
- 21 years or more	53
• Tenure as a Supervisor/Manager	
- Less than 1 year	6
- 1 to 2 years	12
- 3 to 4 years	26
- 5 to 10 years	21
- 11 to 20 years	23
- 21 years or more	11
• Shift	
- First	83
- Second	15
- Third	2
• Generic department supervised	
- Maintenance	9
- Stores, material handling	5
- Shipping, packing	3
- Tool room	8
- Production/assembly	42
- Inspection/quality	15
- Manufacturing/fabrication	16
- Production control	3
- Tool design	0.5

Table 2

Task, KSA and Job Demand Factors

Task Factors

1. Human Relations
2. Determining Short-Term Solutions
3. Maintaining Personal Expertise
4. Tooling Processes
5. Employee Administrative Activities
6. Documentation of Worker Problems
7. Interface with Personnel Dept.
8. Control of Department's Safety and Housekeeping
9. Communications
10. Workload Requirements
11. Budget Operations
12. Team Activities
13. Labor Relations
14. Working with Problem Employees
15. Safety Reporting
16. Utilizing Employee Suggestions and Opinions
17. Salvage/Scrap Operations
18. Rejections/Defect Operations
19. General Daily Activities
20. Overseeing Device/Parts Production
21. Production Control/Parts Scheduling
22. Solving Production Problems
23. Scheduling Operations
24. Obtaining Maintenance for Dept.
25. Lead Person Directions
26. Quality Considerations
27. Inspection Department Operations
28. Interface with Purchasing
29. Maintenance Dept. Operations
30. Material Handling Dept. Operations
31. Shipping, Packing Dept. Operations

Table 2 (cont.)

KSA Factors

1. Composure
2. Labor Relations Knowledge
3. Prints, Specs, & Charts Knowledge
4. Inspection Knowledge
5. Problem Solving Skills
6. Accounting Knowledge
7. Employee Counseling Skills
8. Diplomacy & Tact
9. Packing & Shipping Knowledge
10. Product Knowledge
11. Maintenance Knowledge
12. Interaction Skills
13. Solid State Knowledge

Job Demand Factors

1. Pressure and Pace of Work Activity
2. Physical Requirements of Work
3. Adjustments to Personal Life

Table 3

Scope of Factory Supervisor Job

Variable	% of Supervisors
● Time Spent Interacting With Persons Within Organization	
- 0%	--
- 1 - 10%	1.1
- 11 - 25%	3.3
- 26 - 50%	10.8
- 51 - 75%	24.9
- 76 - 90%	29.3
- 91 - 100%	30.6
● Time Spent Interacting With Persons Outside Organization	
- 0%	31.7
- 1 - 10%	62.9
- 11 - 25%	4.1
- 26 - 50%	1.4
- 51 - 75%	--
- 76 - 90%	--
- 91 - 100%	--
● Number of Employees Supervised	
- 0	--
- 1 - 5	1.6
- 6 - 10	5.9
- 11 - 50	77.1
- 51 - 100	13.7
- 101 - 150	1.3
- 151 - 200	.3
- 201 - 250	--
- More than 250	--

Table 3 (cont.)

Variable	% of Supervisors
● Budget Responsibility	
- 0 - Not responsible for a budget	22.8
- Up to $10,000	1.7
- $10,000 - $100,000	7.3
- $100,000 - $500,000	28.4
- $500,000 - $1 Million	19.7
- Greater than $1 Million	20.2
● Type of Job Prior To Factory Supervisor Position	
Another Supervisory Position in Organization	7.6
Group Leader	31.5
Engineer	6.3
Hourly Factory Employee (other than group leader)	23.4
Office and Technical	28.0
Other Company	3.3

Table 4

Factory Supervisor Stressor Levels

Stressor	$\bar{X}$	SD
Work Overload	3.88	.61
Role Ambiguity	2.66	.75
Role Conflict	2.84	.79
Responsibility for People	4.28	.73

Table 5

Intercorrelations Among Stressors

	Work Overload	Role Ambiguity	Role Conflict	Responsibility For People
Work Overload	--			
Role Ambiguity	.11	--		
Role Conflict	.19	.15	--	
Responsibility for People	.13	.18	.04	--

Table 6

Significant Linear Regression Analyses with

Dependent Variable of Role Ambiguity

Predictors:	Task Factor Ratings		
	$R = .51^{**}$		
	$R^2 = .26$		
	Factors	Beta	ΔR^2
	Rejection/defect operations	-.24*	.04
	Budget operations	.20**	.05
	Maintaining personal expertise	.13*	.02
	Team activities	.13*	.01
	Documentation of worker problems	-.13*	.01
Predictors:	KSA Factor Ratings		
	$R = .44^{**}$		
	$R^2 = .19$		
	Factors	Beta	ΔR^2
	Labor relations knowledge	.15*	.07
	Packing and shipping knowledge	.18**	.02
	Product knowledge	-.21**	.02
	Prints, specifications knowledge	.20*	.04
	Accounting knowledge	.15**	.02
	Solid state knowledge	.16*	.01
Predictors:	Job Demand Factor Ratings		
	$R = .17^{*}$		
	$R^2 = .03$		
	Factors	Beta	ΔR^2
	Physical requirements of work	-.18**	.02

* $p < .05$

** $p < .01$

Table 7

Significant Linear Regression Analyses with

Dependent Variable of Role Conflict

Predictors:	Task Factor Ratings		
	$R = .51^{**}$		
	$R^2 = .26$		
	Factors	Beta	ΔR^2
	Salvage-scrap operations	.26**	.08
	Interface with purchasing	-.25**	.08
	Maintenance department operations	.15*	.02
	Maintaining personal expertise	-.13*	.02
	Scheduling operations	-.35*	.001
	Overseeing device/parts production	.46	.006
Predictors:	KSA Factor Ratings		
	$R = .73^{**}$		
	$R^2 = .13$		
	Factors	Beta	ΔR^2
	Product knowledge	.23**	.03
	Accounting knowledge	.14*	.02
	Employee counseling skills	.16**	.01
	Maintenance knowledge	.23*	.01
Predictors:	Job Demand Factor Ratings		
	$R = .32^{**}$		
	$R^2 = .10$		
	Factors	Beta	ΔR^2
	Pressure and pace of work activity	.23**	.08
	Adjustments to personal life	.16**	.02

* $p < .05$

** $p < .01$

Table 8

Significant Linear Regression Analysis with

Dependent Variable of Responsibility for People

Predictors: Task Factor Ratings		
$R = .70^{**}$		
$R^2 = .49$		
Factors	Beta	ΔR^2
Budget operations	.66**	.32
Employee administrative activities	-.17**	.04
Team activities	-.12*	.02
Obtaining maintenance for department	.17**	.03
Determining short-term solutions	.11*	.007
Inspection department operations	-.23**	.007
Interface with personnel department	.12*	.002
Labor relations	.13*	.005

Predictors: KSA Factor Ratings		
$R = .43^{**}$		
$R^2 = .19$		
Factors	Beta	ΔR^2
Accounting knowledge	.32**	.11
Diplomacy and tact	-.23**	.02
Solid state knowledge	-.15*	.01
Product knowledge	-.14*	.01
Packing and shipping knowledge	.13*	.01

Predictors: Job Demand Factor Ratings		
$R = .22^{**}$		
$R^2 = .05$		
Factors	Beta 1	ΔR^2
Physical requirements of work	.14**	.03
Pressure and pace of work activity	.14**	.02

* $p < .05$
** $p < .01$

Table 9

Significant Linear Regression Analyses with

Dependent Variable of Work Overload

Predictors: Job Demand Factor Ratings

$R = .54^{**}$

$R^2 = .29$

Factor	Beta	ΔR^2
Pressure and pace of work activity	.53**	.29

* $p < .05$

** $p < .01$