THE RELATIONSHIP BETWEEN LEVEL OF SECURITY CLEARANCE
AND STRESS IN ENGINEERING AND DESIGN PERSONNEL

THESIS

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Lauri D. Luce, B.S.
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The present study investigated the relationship between level of security clearance in engineering occupations and stress. A total of 63 male employees in the field of engineering and design with varying levels of security clearance employed by a large Southwestern defense company participated in the study. Data was obtained utilizing the Engineering Stress Questionnaire which measures sources of stress, work locus of control, social support, job difficulty, job characteristics, perceived stress, and demographic variables. T-tests revealed no statistically significant differences between employees with low security clearances and high security clearances with regard to perceived stress level. However, correlational support was found for hypotheses involving social support, job difficulty, job characteristics, sources of stress, and perceived stress. Path analysis was performed to investigate the impact of variable relationships.
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THE RELATIONSHIP BETWEEN LEVEL OF SECURITY CLEARANCE
AND STRESS IN ENGINEERING AND DESIGN PERSONNEL

Due to the tremendous advances made in the medical field, a person's lifestyle has emerged as a significant factor in mental and physical health in modern society. Peoples' occupations have tended to play a prominent role in their lifestyles by providing purpose, affiliation with peers, and the means to provide for themselves and their families. However, for some, the stressors associated with one's occupation can become a liability. Several studies have linked occupational stress with coronary heart disease, hypertension, and various psychological difficulties such as burnout (Cooper & Marshall, 1976; Donovan, 1987; McMichael, 1978; Quick, Horn, & Quick, 1986).

Furthermore, the number of occupational stress illness insurance claims has been increasing since 1980. From 1980 to 1988, occupational stress claims had increased from five percent to fourteen percent of all occupational disease claims. In addition, an average claim for occupationally induced stress has been found to be twice the average claim for a physical injury (Billet, 1988). Consequently, the study of occupational stress and subsequent development of methods to alleviate the negative effects of occupational
stress have increasingly become important and beneficial endeavors. While various occupations have been studied with regard to occupational stress, little research has been available regarding the occupational stressors that engineers in the defense industries in America experience. Therefore, in the present study, sources of occupational stress with engineering and design personnel of varying security clearances will be investigated.

While stress and occupational stress have been studied for many years, no single, unifying theory or model has been accepted. Furthermore, research in this area has grown tremendously despite difficulties in coming to an agreement concerning the very definition of stress itself. This may be due to the broad and subjective nature of this concept (Baron & Byrne, 1987; Beehr & Franz, 1987; Ivancevich, Matteson, Freedman, & Phillips, 1990; Newman & Beehr, 1979). However, Beehr and Franz (1987) have concluded that there is a consensus that the term stressor may be used when environmental stimuli are involved. Similarly, individuals' deviations from their normal responses to stressors have been referred to as strain. For example, anxiety, high blood pressure, and smoking can all be regarded as strains (Caplan, Cobb, French, Harrison, & Pinneau, 1975). With regard to occupational stress, a "job stressor is an environmental condition or event in the workplace that causes strain" (Beehr & Franz, 1987, p. 6).
Models of Stress

Regarding models of stress, Matheny, Aycock, Pugh, Curlette, and Cannella (1986) suggest that most models of stress can be classified into three categories. These include stimulus models, response models, and transactional models. Stimulus models most often involve environmental factors and Matheny et al. (1986), suggest that in these models, the definition of stress utilized is the more common definition of stress, i.e., negative life events. The stress model involving major life events developed by Holmes and Rahe (1967) is an example of a model consistent with this category. Response models emphasize the role of physiological factors in reacting or responding to stressful life events or situations. Selye's (1956) General Adaptation Syndrome is an example of a response model of stress. Transactional models involve the "transaction between the environment and the person" Matheny et al., 1986, p. 502). In these models, more emphasis is placed on the person's perception of appraisal of the situations or events as stressful or not stressful. Several models can be included in this category. They include the Facet-Analysis model by Beehr and Newman (1978), the Stress and Task Performance model by McGrath (1976), the Lazarus Stress and Coping Paradigm (Benner, 1984; Lazarus, 1981, 1984), the Person-Environment (P-E) Fit model developed by Harrison (1978) and Lofquist and Davis (1969), and the Role Stress
model developed by Kahn, Wolfe, Quinn, Snoek, and Rosenthal (1964). Because some of the concepts found in the Person-Environment (P-E) Fit model (Harrison, 1978; Lofquist & Davis, 1969) such as the stress which occurs when a person does not have the necessary skills to perform effectively in their particular job, it was chosen for further elaboration. Similarly, because the constructs of role conflict and role ambiguity are measured in the present study, it was also chosen for further elaboration.

One model whose concepts are commonly found in occupational stress literature has been the Person-Environment (P-E) Fit model (Harrison, 1978; Lofquist & Davis, 1969). This model involves the matching of a person's skills and abilities to the demands and objectives of a job. When a person's abilities and skills are not congruent with job requirements, Person-Environment misfit occurs. This P-E misfit results in the experience of stress and, eventually, negative health consequences (Eulberg, Weekley, & Bhagat, 1988; Harrison, 1978).

Another model commonly found in the stress literature involves organizational stressors and is referred to as the Role Stress model (Kahn et al., 1964). Two main components of this model are role conflict and role ambiguity. Role conflict may occur when one is pressured from others within the organization to carry out conflicting or incompatible job activities. Role ambiguity may occur when people are
unsure of what is required from them regarding their jobs because of vague job descriptions, unclear distinctions between different occupational activities, etc. (Cooper & Marshall, 1976; Kahn et al., 1964). Consequently, consideration of the factors within these two models and their influences on the experience of occupational stress may be beneficial when studying occupational stress.

Variables Affecting Perceptions of Stressors

Due to the complexity of the stress process, it is not surprising that many variables have been found to influence the perception and experience of stress. Some of these variables include personality, social support, job difficulty, job characteristics, and demographic variables. All of these variables relate to the study of work stress in that some can affect a person's perception of stress, and others can help lessen the negative effects of stress. Locus of control, coping skills, and social support are all variables which involve some aspect of the employee personally. They involve employees' resources for dealing with stressful situations. Job difficulty and job characteristics are more specific to the work place itself and can be viewed as possible sources of stress while demographic variables can fit into both categories.

Locus of Control. An aspect of personality commonly studied in stress literature is control (Kobasa & Puccetti, 1983; Newton, 1989). Locus of control is typically
categorized into two poles: external and internal. People with an external locus of control are thought to perceive events as beyond their control. Persons with an internal locus of control are believed to perceive events as within their control. These aspects of perception of control have been the focus of several studies (Arsenault & Dolan, 1983; Krause & Stryker, 1984; Rotter, 1966; Spector, 1988).

Locus of control is thought to be of importance in stress research due to its influence on how people respond to and perceive stressful situations. Typically, persons with an external locus of control are said to respond to stress ineffectively due to their belief that events are not in their control. Consequently, they believe that their actions would do little to change or improve any stressful situation in which they may find themselves. In contrast, those with an internal locus of control are thought to respond to stressful situations more effectively than those with an external locus of control. Persons with an internal locus of control perceive and act as if the stressful situation is under their control. Therefore, they believe they have the ability to contend with stressful situations, because they perceive their actions as being effective. Using this belief, they can reduce the deleterious aspects of a stressful situation (Kobasa & Puccetti, 1983; Krause & Stryker, 1984).
With regard to men, a locus of control that is internal and moderate has been found to be a more effective orientation for dealing with stressful situations than orientations that are extreme and external. Interestingly, even an extreme internal locus of control orientation was not as effective as a locus of control that is moderate and internal (Krause & Stryker, 1984). Furthermore, Spector (1982), in a review of locus of control and its relationship to organizational variables in the workplace, has determined that employees whose locus of control was internal tended to be more motivated and reported more satisfaction regarding their jobs than employees with an external locus of control. In addition, employees whose locus of control was internal had a tendency to prefer participative approaches to supervision while employees whose locus of control was external preferred more directive approaches. These reported differences between external and internal locus of control could possibly be moderators of stress within employees in the presence of different supervisory styles.

**Social Support.** Another possible moderator of the experience of stressors is social support. Social support refers to persons in one's environment who provide emotional and/or tangible resources, their availability, and the perception of being supported by these persons (Cohen & Wills, 1986). It is not clear whether social support has direct or buffering effects in stressful situations (Kobasa
& Puccetti, 1983). However, Holahan and Moos (1986) have suggested that social support has both of these effects and is dependant upon the particular type of social support that is examined.

Regarding the stress-buffering effects of social support, it is thought that social support interacts with stress such that when there is a high level of social support, the effects of stress are reduced (Gore, 1987).

In contrast, some research has emerged indicating that in certain situations the family can become a source of stress rather than providing relief from stress (Handy, 1978; Pavett, 1986). Pavett (1986) has suggested that spouses attempting to relieve the stress of their employed spouses can begin to feel the negative effects of their spouses' stress. When this occurs a feedback loop is established with the spouse now becoming a source of stress instead of a buffer against stress.

Regarding occupational or work stress, social support has been found to be particularly relevant. Pavett (1986) found that the family, as well as the employee, can be affected negatively by a stressful occupation. In addition, Gore (1974), found that regarding job loss, employees who received social support were able to tolerate more stress than employees who were not adequately socially supported. In contrast, Kobasa and Puccetti (1983) have found that support from one's boss was more beneficial in dealing with
work stress than support from one's family. Similarly, Caplan et al. (1975) have found that low social support from the employees' supervisor and coworkers was associated with dissatisfaction with their job and depression. Thus, the relationship of social support and stress is worth examining due to its effects on the tolerance and perception of stressful work situations.

**Job Difficulty.** Another construct related to work stress is job difficulty. Ivancevich and Smith (1982), have defined difficulty with regard to one's job as "difficult to perform or difficult to endure" (p.393). Ideally, there is a level of job difficulty that is not too stressful for the employee by being too challenging or by being too easy or unchallenging. Employees can utilize a degree of difficulty or challenge in their jobs in order to obtain satisfaction and an optimal level of performance (Ivancevich & Smith, 1982; London & Klimoski, 1975).

There are several reasons why a job may be too difficult. One factor may be due to the inherent features of the job itself. A second factor may be due to some aspect of the job environment. Furthermore, an employee may not have the abilities to be successful in performing a particular job. In addition, the job may be emotionally unpleasant for the employee or resources and tools may not be available for the employee to complete tasks in a timely manner. The reasons presented here refer to difficulty
experienced by employees who have been working at a particular job long enough to overcome the difficulties of the job but have been unable to do so for various reasons. However, some of these difficulties can be eliminated or modified in order to bring job difficulty to an optimal level (Ivancevich & Smith, 1982).

Regarding engineering personnel, Ivancevich and Smith (1982) found that experience in a particular job is important to consider when looking at job difficulty. In their study, uncertainty, job tension, and time pressure were found to differ with regard to an employee's experience or tenure in a particular job. Furthermore, if employees have jobs that are inherently too difficult for them, they will experience more stress than employees who do not find the same work too difficult.

**Job Characteristics.** Another construct relevant to the study of occupational stress is job characteristics. This involves the demands, responsibilities, and structure associated with a particular job. Sims, Szilagyi, and Keller (1976) state that there are three basic areas in which the measurement of job characteristics has been beneficial. These include alienation from one's job or career, work motivation, and leadership behavior. Hackman and Lawler (1971) have suggested that job characteristics can affect employee motivation. They state that there are optimum job characteristics that contribute to employee
motivation. These include characteristics which contribute to the employees feeling responsible for their work in a personal sense, perceiving the outcomes or results of their jobs as meaningful and worthwhile, and receiving feedback from the task itself, co-workers, or supervisors. Furthermore, Hackman and Lawler (1971) found that jobs high in the dimensions of autonomy, task identity, task significance, task variety, and feedback tended to enhance employee motivation, satisfaction, and performance.

Regarding work stress, if people view the job characteristics of their occupations as very rewarding, their perception of the stressors associated with that occupation may be affected, so they may not perceive or experience the stress associated with that occupation. In other words, persons in this situation perceive that the positive aspects associated with their jobs outweigh the various negative aspects of their jobs, and they may not perceive their jobs as inherently stressful.

Demographic Variables. The broad category of demographic variables is also relevant to studying occupational stress. Demographic variables involve information such as age, gender, occupation, length of employment with company, and other types of personal information.
The Stress of Engineers

In the present study, the relationship between occupational stress and level of security clearance with engineering and design personnel was examined. Several studies have been conducted with engineering personnel and the stress and difficulties associated with this particular occupation (Hall & Mansfield, 1975; Keenan & Newton, 1984, 1987; Saleh & Desai, 1986).

In a longitudinal study of young professional engineers in Great Britain, Keenan and Newton (1984) identified four specific areas which are sources of stress. These sources include people, information, technical, and report writing difficulties.

Investigating the effects of age and seniority with engineers and scientists, Hall and Mansfield (1975) found that distinct variables, such as job involvement, perceived support from the organization, and security, characterized different career stages. Furthermore, Saleh and Desai (1986) found that overall, engineers experience a moderate amount of stress. An unfair reward system was found to be the greatest source of stress for engineers. Time pressure and a lack of opportunities for professional growth and utilization of present abilities were also found to be high sources of stress.
Security Clearance Occupations

High security clearance occupations are hypothesized to be more stressful than low security or no security clearance occupations due to the various restrictions associated with this clearance. From discussing these ideas with engineers who work in security clearance positions, it was discovered that there are a number of restrictions associated with high security clearances that can be considered stressful. For example, employees in some high security clearance positions are unable to discuss their work with anyone, even within the same company, except on a "need to know" basis. Therefore, if problems arise which are stressful to employees, it may be difficult for them to receive support from other employees, family, or friends due to the confidential nature of their occupations.

Employees with high security clearances must be careful not to over extend themselves financially, have serious marital difficulties, or consume excessive alcohol or drugs, because these are considered threats to company security. Furthermore, in high security positions there are special rules for handling classified material. For example, typewriter ribbons used in high security programs must be disposed of in a special manner or locked away when not in use, and care must be taken not to show information on computer screens in front of personal with lower security clearances. No programmable calculators, radios, tape
recorders, or cameras are allowed in high security areas. Employees in high security positions are required to report any contact with foreign nationals, as well as the media.

Employees watch other employees to prevent security violations. There can be times when employees are compelled to report fellow employees for security violations. Therefore, employees have the sense that they are being watched at all times. If employees lose their security clearances, they will be re-assigned to a lower security position in the company if such a position is available. Therefore, employees must be aware of the regulations concerning security clearance violations and must be careful to avoid any serious violations for their own job security.

Due to the limited research available on the sources of stress for engineers in the United States and in the defense industry, especially with regard to security clearances, it is thought that the present study can begin to provide some valuable information regarding this occupation in the United States. Once sources of stress are discovered, then steps can be taken to determine if these sources of stress can be modified or alleviated through various means such as stress management techniques and/or organizational restructuring.

Hypotheses

1. For engineering personnel, high security clearance occupations are more stressful than low security clearance occupations.
2. Engineering personnel with external locus of control characteristics tend to perceive more stress than those with internal locus of control characteristics.

3. Engineering personnel that receive a low level of social support at work and at home perceive more stress than those who receive a high level of social support.

4. Engineering jobs that are too difficult or are very unchallenging are perceived as more stressful than those that are optimal in their degree of difficulty.

5. Engineering personnel who experience a high degree of job enrichment or positive job characteristics tend to perceive less stress than those employees who experience a low degree of job enrichment.

6. Engineering personnel who encounter sources of stress in their occupations tend to perceive more stress than those employees who do not encounter sources of stress (see Figure 1).

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**Figure 1.** Theoretical Model for Moderating Variables in the Stress Process.
Method

Subjects

A total of 63 employees of a large Southwestern defense company in the field of engineering and design with varying levels of security clearances voluntarily participated in the study. In order to control for gender differences, only males were allowed to participate. Furthermore, because engineering and design have traditionally been male-oriented professions, it would have proven difficult to find an acceptable number of female participants. Although the cover letters accompanying the questionnaires specified that only males would be eligible to participate in the study, three questionnaires were completed by females. However, these questionnaires were not included in the total number of questionnaires and the data from these questionnaires were not included in the present study.

The participants were divided into two groups based upon whether they had high (secret or top secret) or low (none or confidential) security clearances. A total of 51 of the participants were classified as having high security clearances and twelve of the participants were classified as having low security clearances.

Materials

The data were obtained by utilizing a questionnaire consisting of seven measures. These included portions of the Stress Diagnostic Survey (SDS) (Ivancevich & Matteson,
1982), the Work Locus of Control Scale (Spector, 1988), a measure of social support (Caplan et al. 1975), the engineer job difficulty index (Ivancevich & Smith, 1982), the Job Characteristic Inventory (Sims et al., 1976), the Perceived Stress Scale (PSS) (Cohen, Karmarck, & Mermelstein, 1983), and demographic information. Additionally, envelopes and a box were provided to put questionnaires in upon completion.

**Dependent Variables**

**Stress Diagnostic Survey (SDS).** The Stress Diagnostic Survey (SDS) (Ivancevich & Matteson, 1982) is "designed to measure employee perceptions of stress" and served as the measure of sources of stress in this study (Ivancevich & Matteson, 1982, p.1). The entire survey consists of sixty short statements of conditions. The participants rated these statements using a seven-point scale ranging from "never" to "always" according to the frequency with which the content in the statements are sources of stress.

The SDS (Ivancevich & Matteson, 1982) is divided into two global categories which are referred to as macrostressors and microstressors. These global categories are further subdivided into a total of fifteen categories. The macrostressors consist of: Politics, Human Resources Development, Rewards, Participation, Underutilization, Supervisory Style, and Organization Structure. The microstressors consist of: Role Ambiguity, Role Conflict, Quantitative Overload, Qualitative Overload, Career
Progress, Responsibility for People, Time Pressure, and Job Scope (see Appendix A).

In keeping with the literature on work stressors, the dimensions of Rewards, Participation, Supervisory Style, Role Ambiguity, Role Conflict, Quantitative Overload, Qualitative Overload, and Time Pressures, which together consist of thirty-two statements, were measured as potential sources of stress. The reliability coefficients for these particular dimensions range from 0.59 to 0.81 (Ivancevich & Matteson, 1982). Specific reliability information is provided in Table 1 (see Appendix B). Validity information is not currently available on the SDS, but content validity appears to be acceptable (see Appendix A).

In the Reward dimension, stress is perceived by the employee due to a lack of a relationship between employee performance and rewards. Participation refers to the stress created due to a lack of employee input in decision making. In the Supervisory Style dimension, stress is created due to inadequate quality of supervision. Role Ambiguity refers to the stress created due to a lack of clear, defined expectations and responsibilities in an employee's job. The Role Conflict dimension refers to the extent that an employee receives incompatible or conflicting requests to carry out job activities. Quantitative Overload is the stress created by having too much work to do in the amount of time available. Qualitative Overload refers to stress...
caused by tasks required of the job that are too complex for the employee. Time Pressures involves stress that can accompany time demands and having to meet tight deadlines.

The internal consistency of this measure was found to be acceptable and ranges from 0.59 to 0.79 overall (Ivancevich & Matteson, 1982). Reliability coefficients ranging from 0.58 to 0.87 have been found for the macrostressor category. Coefficients for the microstressor category have been found to range from 0.64 to 0.89 (Ivancevich & Matteson, 1982; Saleh & Desai, 1986). Saleh and Desai (1986) found that the coefficient of internal consistency for the total score on the Stress Diagnostic Survey was 0.97 in their study.

The Perceived Stress Scale (PSS). The Perceived Stress Scale (PSS) (Cohen et al., 1983) was utilized as a measure of employees' perceptions or appraisals of stress. It was designed to measure the "degree to which situations in one's life are appraised as stressful" (Cohen et al., 1983, p.387). It consists of fourteen questions to which the participants respond using a five-point scale ranging from "never" to "very often" (see Appendix A).

The reliability for this measure was found to be adequate across three different populations with an average coefficient alpha of 0.85 (see Table 1, Appendix B). Similarly, in another study involving college freshmen, Cohen, Sherrod, and Clark (1986) found a coefficient alpha
of 0.85 for the Perceived Stress Scale. Regarding validity, the Perceived Stress Scale correlated with other related variables as expected. In addition, Cohen et al. (1983) found that the Perceived Stress Scale was a superior predictor of health services use when compared with two life-event scales.

Independent Variables

The Work Locus of Control Scale. The Work Locus of Control Scale (Spector, 1988) was used as a measure of personality. It consists of sixteen statements to which the participants respond using a six-point scale ranging from "disagree very much" to "agree very much" (see Appendix A). The internal consistency of this measure was found to be adequate across six different populations with an average coefficient alpha of 0.825 (see Table 1, Appendix B). With regard to validity, Spector (1988) found that correlations between locus of control and other related organizational variables were as expected. There are other measures of locus of control, but this particular measure was chosen for its specificity with regard to work behavior.

Social Support. The level of social support was obtained using a measure developed by Caplan et al. (1975). This measure consists of four questions containing three categories each of persons from which social support might be received. These include the (a) employee's supervisor, (b) others at work, and (c) wives, friends, and relatives.
Reliabilities for each category are 0.83, 0.73, and 0.81, respectively (see Table 1, Appendix B). Caplan et al. (1975) found support for discriminant validity for this social support measure due to average inter-item correlations within the same measure being higher than average correlations of items with other measures. The participants rated these three categories using a five-point scale ranging from "don't have any such person" to "very much" regarding received support in response to the particular question (see Appendix A).

**Engineer Job Difficulty Index.** This measure, developed by Ivancevich and Smith (1982), consists of 22 descriptions of potential difficulties associated with the engineering profession. Participants rated the extent to which each description applied to their current jobs using a seven-point scale which ranges from "minimum" to "maximum." However, the researcher felt these values were too confusing so "not at all" to "very much" was used (see Appendix A).

This measure is made up of three factors. Factor one is uncertainty, which refers to the reliability and predictability of information and supervisors. Factor two is decision-making latitude which involves employee input and perception of influence in the decision making process. Factor three is time pressure which refers to amount of time available for meeting deadlines and the pressure to meet schedules. The reliability coefficients for each of these
factors are 0.79, 0.80, and 0.85, respectively (see Table 1, Appendix B). Ivancevich and Smith (1982) found a linear relationship between their measure of job difficulty and the constructs of intrinsic and extrinsic satisfaction, job tension, and performance.

The Job Characteristic Inventory. The Job Characteristic Inventory (Sims et al., 1976) served as a measure of the characteristics of one's job. Six dimensions are considered: Variety, Autonomy, Feedback, Dealing with Others, Task Identity, and Friendship Opportunities. Variety refers to the range of tasks the employee performs and the variety of equipment used. Autonomy is the degree to which employees have a significant degree of input regarding the performance and scheduling of their jobs. Task Identity refers to the extent to which employees complete an entire project and are able to associate their efforts with the completed project or task. Feedback refers to employees receiving information concerning their performance of their jobs. Dealing with Others is the extent to which employees cooperate with others to complete a task. Friendship Opportunities refers to the extent to which employees are free to establish informal relationships with other employees at work.

The measure itself consists of thirty questions. The participants responded using a five-point scale ranging from "very little" to "very much" on items 1 - 13, and a five
point scale ranging from "a minimum amount" to "a maximum amount" for items 14 - 30 (see Appendix A). This measure has acceptable reliability for all six dimensions ranging from 0.68 to 0.84 (see Table 1, Appendix B). Sims et al. (1976) found acceptable convergent and discriminant validity for four of the six dimensions of job characteristics after correlating them with the related constructs of task complexity, adequacy of authority, role ambiguity, and warmth.

Demographic Variables

Demographic information was obtained through questions generated by the researcher regarding age, marital status, gender, level of security clearance, job title, how many years worked for the company, how much time per day is spent in secure areas, hours worked per week, overtime, and whether employees felt that the clearances on their projects were warranted. This information was obtained through a series of questions with a multiple choice and fill-in-the-blank format. With regard to security clearance, the participants responded to a question indicating whether their security clearance was high (top secret or secret) or low (no clearance of confidential).

Procedure

The researcher met in a conference room at the worksite with two groups of potential participants assembled by a contact within the company. Earlier, the contact sent out a
memo which stated what the meetings were to be about, who the researcher was, and where and when the meetings were to take place. Employees were given the option of attending either meeting. The memos were sent to approximately 60 employees within a convenient geographic part of the company. At these two meetings, a brief presentation was given by the researcher which explained what the study was about and how to participate in it. The questionnaires, enclosed in envelopes, were passed out to the potential participants at the beginning of each of the two meetings. During the presentation, the researcher emphasized that participation in the study was voluntary and anonymous. The employees were then asked to take the questionnaires with them and fill them out. Those who chose not to participate had the options of taking the questionnaires with them and not filling them out or leaving the questionnaires in the conference room. Participants were asked to return the questionnaires in sealed envelopes within two days to a box which was located at a particular secretary's desk. Forty-five questionnaires were taken by those employees who attended the two meetings. Thirty-five questionnaires were then distributed by the contact among employees at their work stations. A total of eighty questionnaires were distributed.

A total of 41 questionnaires were returned to the box. However, 37 questionnaires were completed by employees with
high security clearances and four questionnaires were completed by employees with low security clearances. In order to have a more equal number of participants in each group (high, low), a second batch of 42 questionnaires was distributed by company mail to prospective participants from a different geographic part of the company.

Although the cover letter (see Appendix A) stated that the questionnaires should be completed at the worksite, the contact explained at the meetings, when passing out the remaining questionnaires, and in a memo accompanying the second batch of questionnaires that the company required them to complete the questionnaires on their own time. Therefore, all of the questionnaires were not necessarily completed at the worksite.

Of the second batch of 42 questionnaires that were distributed, 22 were completed and returned. Out of this second distribution of questionnaires, fourteen were completed by employees with high security clearances and eight were completed by employees with low security clearances. A total of 63 questionnaires were completed and returned out of a total distribution of 122. The return rate was 51.6 percent.

Results

Means and standard deviations were computed for each of the variables. Means and standard deviations were also computed for each variable with regard to low security
clearance and high security clearance. Also, t-tests were computed to determine if there were any significant differences between employees with high security clearances and low security clearances for all of the variables (see Table 2, Appendix B).

Reliabilities were computed for each of the measures in the questionnaire as well as their subscales. The reliabilities for each measure and its subscales are presented in Table 3, Appendix B). The coefficient alpha of the Stress Diagnostic Survey (SDS) (Ivancevich & Matteson, 1982), was found to be 0.91. Reliabilities for each dimension of the SDS ranged from 0.71 to 0.89. The reliability coefficient for the Work Locus of Control scale (WLOC) (Spector, 1988), was 0.83. Regarding social support, the reliability for the social support measure developed by Caplan et al. (1975) was 0.81. Reliabilities for each dimension in this scale ranged from 0.69 to 0.86. The reliability for the engineer job difficulty index (JDIE) (Ivancevich & Smith, 1982), was found to be 0.92. The reliability of the Job Characteristics Inventory (JCI) (Sims et al., 1975), was 0.87. Reliabilities for each dimension ranged from 0.26 to 0.80. The reliability for the Perceived Stress Scale (PSS) (Cohen et al., 1983), was 0.89.

Correlations were computed for all of the variables in order to determine if there were any relationships between them (see Table 4, Appendix B). With regard to the SDS
(Ivancevich & Matteson, 1982), each of its dimensions was significantly correlated to the entire scale at the $p<.01$ level. Each dimension of the social support scale was significantly correlated to the entire scale at the $p<.01$ level. Each dimension of the Job Characteristics Inventory (JCI) (Sims et al., 1976) was significantly correlated to the entire measure at the $p<.01$ level.

The SDS (Ivancevich & Matteson, 1982) was positively correlated at a significance level of $p<.01$ to the WLOC (Spector, 1988), the JDIE (Ivancevich & Smith, 1982) and the PSS (Cohen et al., 1983). As expected, the SDS (Ivancevich & Matteson, 1982) was negatively correlated at a significance level of $p<.01$ to the measure of social support (Caplan et al., 1975) and the JCI (Sims et al., 1976). The WLOC (Spector, 1988) was positively correlated to the JDIE (Ivancevich & Smith, 1982) at the $p<.01$ level and to the PSS (Cohen et al., 1983) at the $p<.05$ level of significance. Negative correlations were found between the WLOC (Spector, 1988) and the measure of social support (Caplan et al., 1975) and the JCI (Sims et al., 1976) at the $p<.05$ level of significance. The JDIE (Ivancevich & Smith, 1982) was found to be positively correlated to the PSS (Cohen et al., 1983) at the $p<.01$ level of significance. The measure of social support (Caplan et al., 1975) was found to negatively correlate with the JDIE (Ivancevich & Smith, 1982) at the $p<.01$ level of significance and the JCI (Sims et al., 1976)
was found to negatively correlate with the JDIE (Ivancevich & Smith, 1982) at the p<.05 level of significance. The JCI (Sims et al., 1976) positively correlated and the PSS (Cohen et al., 1983) negatively correlated with the measure of social support (Caplan et al., 1975) at the p<.01 levels of significance. The JCI (Sims et al., 1976) positively correlated and the PSS (Cohen et al., 1983) negatively correlated with the measure of social support (Caplan et al., 1975) at the p<.01 levels of significance. The JCI (Sims et al., 1976) correlated negatively with the PSS (Cohen et al., 1983) at the p<.01 level of significance.

**Hypothesis 1.** For engineering personnel, high security clearance occupations are more stressful than low security clearance occupations. No statistically significant correlations were found to indicate that level of security clearance correlated with level of perceived stress. Furthermore, t-tests did not reveal any statistically significant differences between employees with high security clearances and those with low security clearances regarding level of perceived stress or sources of stress.

However, statistically significant differences regarding demographic variables were found between these two groups. For example, employees with high security clearances (M=4.31) have had high security clearance positions for longer periods of time (between 6 and 10 years) than employees with low security clearances (M=3.25).
have had their low security clearance positions (between 1 and 5 years), \( t(61) = -2.99, p < .01 \). Employees in high security clearance positions (\( M = 2.25 \)) spend more hours a day in secure areas at work (3-4 hours) than employees in low security clearance positions (0-2 hours) (\( M = 1.00 \)), \( t(61) = -2.79, p < .01 \). Also, employees with high security positions (\( M = 1.14 \)) reported that they felt that the level of security for their projects was warranted, whereas those employees in low security positions (\( M = 2.17 \)), reported that they did not feel that the level of security for their projects was warranted, \( t(61) = 3.24, p < .01 \).

**Hypothesis 2.** Engineering personnel with external locus of control characteristics tend to perceive more stress than those with internal locus of control characteristics. A low correlation (within the range of 0.20-0.39) indicated that employees who are more external in locus of control tend to perceive their situations as being stressful.

**Hypothesis 3.** Engineering personnel who receive a low level of social support at work and at home perceive more stress than those who receive a high level of social support. Moderate correlations (within the range of 0.40-0.69) suggested that the more support employees receive from their bosses, coworkers, and families, the less they perceive their situations as being stressful.
Hypothesis 4. Engineering jobs that are too difficult or are very unchallenging are perceived as more stressful than those that are optimal in their degree of difficulty. A moderate correlation indicated that the more job difficulty employees experience, the more they tend to perceive their situations as being stressful.

Hypothesis 5. Engineering personnel who experience a high degree of job enrichment or positive job characteristics tend to perceive less stress than those employees who experience a low degree of job enrichment. A low correlation suggested that the more employees' jobs have positive characteristics, the less they perceive their situations as being stressful. A moderate correlation was found which indicated that the more task identification employees experience, the less they perceive their situations as being stressful.

Hypothesis 6. Engineering personnel who encounter sources of stress in their occupations tend to perceive more stress than those employees who do not encounter sources of stress. A moderate correlation suggested that the more sources of stress employees encounter, the more they perceive their situations as being stressful. Specifically, moderate correlations implied that the more employees experience role ambiguity, role conflict, quantitative overload, and time pressures, the more they tend to perceive their situations as stressful. Furthermore, low
correlations indicated that the less participation, the more inadequate supervision received, and the more qualitative overload employees experience, the more they perceive their situations as stressful.

A series of two contingent path models were investigated. The first model described sources of stress and the second model represented perceived stress (see Figure 2). In the first model, two direct effects were revealed for work locus of control and job difficulty regarding sources of stress. The relationships between level of security clearance, job characteristics, social support and sources of stress were not statistically significant in the first model. In the second model, a direct effect for sources of stress was found and an indirect effect for social support was found regarding perceived stress. The other variables in the second model were not statistically significant.

![Figure 2. Path Analysis Model of Moderating Variables in the Stress Process.](image)
In summary, based upon the data from the present study, there were no statistically significant differences between employees with high security clearances and low security clearances regarding perceived stress level. However, statistically significant correlations suggested that employees whose locus of control characteristics are more external tend to perceive their situations as stressful. Employees who receive more support from their bosses, coworkers, and families do not tend to perceive their situations as stressful. The more difficulties employees encounter while attempting to perform their jobs, the more they perceive their situations as stressful. The more positive a job's characteristics are, the less likely employees working in those jobs perceive their situations as stressful. The more sources of stress employees contend with, the more they perceive their situations as being stressful. Lastly, path analysis revealed direct effects for work locus of control and job difficulty regarding sources of stress. A direct effect for sources of stress and an indirect effect for social support were found regarding perceived stress.

Discussion

Based upon the results found in the present study, there is no support for the hypothesis which states that employees with high security clearances perceive more stress than those with low security clearances. However, there are
some statistically significant differences between employees with differing security clearances. These include significant differences in the length of time employees have been at their current level of security clearance, the number of hours spent in secure areas daily, and the employees' opinions regarding whether the level of security for their projects is warranted.

Possibly employees who have been employed with the company for relatively short periods of time may not have had the opportunities for advancement to higher security risk projects as those employees who have been with the company for longer periods of time. In addition, employees with low security clearances may not work on projects that warrant working in secure areas for extended periods of time, whereas employees with high security clearances may be required to spend more time in secure areas due to the nature of the projects in which they are involved. Also, employees with low security clearances may feel that the precautions they must take to work on their projects are unnecessary. In contrast, based upon the data in the present study, employees with high security clearances tend to feel that the level of security for their projects is warranted.

Although no statistically significant differences are present between employees of differing security clearances, there is some correlational support for the hypothesis which
states that employees with external locus of control characteristics have a tendency to perceive their situations as stressful in comparison to employees who are more internal in locus of control. These results are consistent with the majority of the stress and locus of control literature. For example, persons whose locus of control characteristics are more external than internal are thought to respond to stressful situations ineffectively, because they believe that events are not in their control. As a result, they do not believe that their actions can change or improve stressful situations.

Several correlations suggest support for the hypothesis which social support received from work and the home tend to lessen employees' perceptions of stress. For all three components of social support, boss, coworkers, and family, as well as overall support, correlations indicate the more social support employees receive, the less they perceive their situations as stressful. These findings are consistent with the literature on social support and stress. Apparently, the people in employees' environments who provide them with support (i.e., emotional and tangible resources) are able to assist employees in lowering their perceived stress level.

A correlation found between job difficulty and perceived stress provides partial support for the hypothesis which states that engineering jobs that involve too much
difficulty or not enough challenges tend to be perceived as more stressful than jobs with an optimal balance. For example, the data from the present study are consistent with the literature on job difficulty and suggest that more job difficulties employees experience (i.e., uncertainty, job tension, time pressures), the more they perceive their situations as stressful.

Correlational support found between job enrichment or positive job characteristics, specifically autonomy, feedback, and task identity, and level of perceived stress, provide support for the hypothesis which states that employees may not perceive the actual level of stress associated with their occupations if the characteristics of their jobs are positive (i.e., rewarding or satisfying). The more feedback employees receive concerning their job performance, the less they experience their situations as stressful. In addition, the more input employees have in determining how to perform their jobs and the more employees are able to associate their efforts with the completed project or task, the less they perceive their situations as being stressful. This makes intuitive sense in that information about job performance can let the employees know that they are doing a satisfactory job as well as making them aware of areas in which they may need improvement. This kind of information aids employees in performing their jobs adequately. Also, when employees have some degree of
control over the outcome of projects that they are involved in, this may give them a sense of efficacy and may reduce their perceptions of the stress they may be experiencing.

Correlational support is evident based on the data from the present study for the hypothesis which states that employees who encounter sources of stress in their occupations tend to have a higher level of perceived stress than those employees who do not encounter sources of stress. For example, the more employees are unclear about what is expected of them in their jobs, the more conflicting demands are placed upon them, the more they are overwhelmed by their workload, and the more time pressures they experience, the more they tend to perceive their situations as stressful. Furthermore, the less employee input is utilized by their superiors, the more quality of supervision received is inadequate, and the more employees are required to perform tasks which are too complex for them, the more they perceive their situations as stressful. In addition, other correlations suggest that the more sources of stress employees experience, the more external in locus of control employees are likely to be, the more job difficulty they experience, the less input they have in determining how to perform their jobs, the less feedback they receive concerning their job performances, and the fewer opportunities they have to develop friendships at work.
Some significant direct and indirect effects occur in the two contingent path models investigated in this study. In the first model, it appears that work locus of control and job difficulty are two direct effects attributable to sources of stress. The more external in locus of control employees are and the more job difficulty they encounter, the more sources of stress they experience. It is interesting that social support does not have a significant impact related to sources of stress in light of the relatively strong correlational relationship it has with sources of stress. Possibly there are relationships between social support and other variables which may have lessened its single effect on sources of stress. Positive job characteristics or job enrichment also is not attributable to sources of stress. Again, this seems unusual due to the correlational relationship it has with sources of stress. It is possible that job enrichment is closely related to other variables and this may have lessened its individual impact on sources of stress. Lastly, level of security clearance has no significant impact on sources of stress. Perhaps level of security clearance is best conceptualized as a moderator between sources of stress and perceived stress as opposed to being directly related to sources of stress.

Regarding the second model, sources of stress have direct effects on perceived stress while social support has
an indirect effect. In other words, if employees experience sources of stress, they will probably perceive this as stressful. In contrast, support employees receive from supervisors, coworkers, and family tends to lessen employee perceptions of stress.

While job difficulty has an impact on sources of stress, it has no significant impact on perceived stress. In the second model, a stepwise method dropped job difficulty from the equation. There may have been some relationship between job difficulty and other predictors or some unmeasured third factor may have intervened in this relationship between job difficulty and perceived stress. Also, work locus of control does not appear to have a direct impact on perceptions of stress. This may be due to its close relationship to sources of stress. Also, positive job characteristics have no direct relationship to perceived stress. This does not seem too unusual due to the lack of impact they have on sources of stress. Lastly, level of security clearance does not have a direct effect on perceived stress. Again, it is possible that level of security clearance is a moderating variable between sources of stress and perceived stress. However, due to its lack of impact on either variable, level of security clearance may not be a significant factor regarding stress. Despite these results, it must be noted that the sample size for the present study is relatively small and skewed in the
direction of high security clearance positions. This may have affected the impact that the level of security clearance has on sources of stress and perceived stress.

Based on the findings of this study, the difficulties employees experience in their jobs are related to the sources of stress they experience. Support from supervisors, coworkers, and family is important in lessening the experience of perceived stress. Sources of stress are remarkable in their relationship to the experience of perceived stress.

It may be beneficial for this company to explore the difficulties related to its employees' jobs and attempt to determine effective methods of eliminating or lessening these difficulties. Furthermore, it would be beneficial to cultivate support from supervisors and coworkers for employees. Finally, it may be beneficial for the company to determine the potential causes for the sources of stress its employees encounter within the organization and attempt to make appropriate changes where they are feasible within the structure of this particular industry.

Future Research

Regarding future research, perhaps in future studies, questionnaires can be sent out to a larger number of employees. Secondly, it may be more beneficial to ask the employees what type ("black" or "white") and how many of what type of programs they are working on as opposed to just
their security clearances. A "black" program is one in which there is no public information available about the program due to the risks to national and corporate security. It is completely classified. Employees working on these types of programs typically are not allowed to talk about the projects they are working on with anyone not directly involved in those projects. A "white" program is one in which some public information is available about the program although parts of that program may be classified. For example, typically employees can acknowledge that the program exists. Unfortunately, during the formulation of the present study, the contact at the worksite let the researcher know that this kind of information is obtained on a "need to know" basis and that the researcher did not "need to know" information about what types ("black" or "white") of programs employees are working on due to the fact that this study will be in print.

Furthermore, regarding future research, it may be beneficial to compare the overall data in the present study with data from engineers who are not in fields that require security clearances using the Engineering Stress Questionnaire. Based on past research of its individual scales and the present study, it appears to be a reliable measure. In a study of this nature, it may be possible to determine if security clearance itself is a source of stress as opposed to low or high levels of security clearance.
APPENDIX A

ENGINEERING STRESS QUESTIONNAIRE
Dear Sir:

I am a graduate student in the Department of Psychology at the University of North Texas involved in a study concerning occupational stress. The following questionnaire is designed to measure the stress of engineering employees. Your participation is voluntary and anonymous. There will be no penalty if you choose not to participate. The questionnaire contains items concerning potential sources of stress at work, how you perceive the work environment, emotional support received from others, potential difficulties in engineering occupations, and different aspects of engineering occupations.

Please do not write your name anywhere on the questionnaire. I don't need to know who you are. Your choice to participate and your responses if you do choose to participate will not be identified with you personally. Each set of questions has its own instructions and the entire questionnaire should take about thirty minutes to complete. If at all possible, please complete the questionnaire at work. If you must complete it away from work, do not discuss it with anyone until after you have turned it in. Also, please do not discuss the questionnaire with others at work until at least three days after you have completed it. Please return the questionnaire to the box by (secretary's) desk in, at the most, two days after you have completed it. Also, remember to seal the envelope to assure your anonymity.

Again, your participation is voluntary and anonymous. If you chose not to participate, there will be no penalty. I will be the only person who sees your actual responses and they will be kept confidential. After the results have been analyzed, a debriefing meeting will be scheduled to explain the results and to answer any questions you may have. Through the questionnaire, it is hoped that some of the stressors that employees in engineering and related fields experience will be identified. Through your participation, it is hoped that understanding will be gained on how to best satisfy your needs as employees as well as the needs of the organization who employs you.

Your cooperation and participation are greatly appreciated.

Sincerely,

Lauri D. Luce, B.S.

THIS PROJECT HAS BEEN REVIEWED BY UNIVERSITY OF NORTH TEXAS COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (Phone: 565-
1. Directions: Please circle the number of the response beside or under the question unless a fill-in response is indicated.

1. Sex: 1. male 2. female

2. Age: 1. 18-30 2. 31-40 3. 41-50 4. 51-60 5. 61 or more


4. How long have you been with this company?
   1. 6 months of less 2. 7 months to 1 year
   3. Between 1 and 5 years 4. Between 6 and 10 years
   5. More than 10 years

5. How long have you been in your present position?
   1. 6 months or less 2. 7 months to 1 year
   3. Between 1 and 5 years 4. Between 6 and 10 years
   5. More than 10 years

6. What is your job title?

7. What is your current level of security clearance?
   1. no clearance or confidential 2. secret or top secret

8. How long have you been at this level of security clearance?
   1. 6 months or less 2. 7 months to 1 year
   3. Between 1 and 5 years 4. Between 6 and 10 years
   5. More than 10 years

9. How many hours a week do you work?
   1. less than 40 hours 2. 40-45 hours 3. 46-50 hours
   4. over 50 hours

10. In the last week, how many hours of what you consider "overtime" did you put in?
    1. none 2. 1-5 hours 3. 6-10 hours
    4. over 10 hours

11. How many hours a day do you spend in secure areas?
    1. 0-2 hours 2. 3-4 hours 3. 5-6 hours 4. 7-8 hours
    5. over 8 hours

12. Do you feel that the level of security for your projects is warranted?
    1. yes 2. no
II. Directions: For each item please indicate how often the condition the item describes is a source of stress to you. Write the appropriate number (1-7) for each item which best describes how frequently each item is a source of workplace stress on the line in front of each item.

1 = never  2 = rarely  3 = occasionally  4 = sometimes  
5 = often  6 = usually  7 = always

__1. Promotions are not based on performance.
__2. People working here do not have the opportunity to participate in making significant decisions.
__3. Supervisors do not go to bat for their subordinates with their superiors.
__4. There does not seem to be a clear relationship between job performance and rewards.
__5. Opinions of employees about the job are not listened to by management.
__6. Supervisors are not concerned about the personal welfare of their subordinates.
__7. People are not rewarded on the basis of solid performance.
__8. Employees have no influence over how to do their jobs.
__9. Supervisors show a lack of trust in their subordinates.
__10. The rewards for working here are not handed out fairly.
__11. Employees are only asked to participate in making trivial decisions.
__12. Supervisors do not show enough respect for their subordinates.
__13. The goals and objectives for my job are not clear.
__14. I am asked to do a lot of unnecessary projects.
__15. I have to take work home to stay caught up.
__16. The work quality standards here are unrealistic.
__17. The time deadlines for completing work assignments are too unreasonable.
1 = never 2 = rarely 3 = occasionally 4 = sometimes 5 = often 6 = usually 7 = always

18. It is not clear to me what my job responsibilities are.
19. I seem to receive conflicting requests from different people (e.g., co-workers, bosses).
20. I spend too much time in unimportant meetings which take me away from my work.
21. My assigned tasks are too difficult for me to do.
22. I have to rush in order to complete my job.
23. I am not sure of exactly what is expected of me.
24. I do things on the job that are accepted by one person and rejected by another person.
25. I am responsible for too many different activities.
26. I am asked to do things that I have not been trained to do.
27. There is just not enough time to do my work.
28. I am not certain of how much authority I have.
29. I can't seem to do my job because I am asked to do too many conflicting things.
30. I have too much work to do to be able to complete it all in a timely fashion.
31. I can't do a good job with my present skills and abilities.
32. I am constantly working against the pressure of time.
III. Directions: Indicate your beliefs about work by writing a number from the following scale on the line in front of each item to indicate your opinion.

1 = disagree very much  2 = disagree moderately  
3 = disagree slightly  4 = agree slightly  
5 = agree moderately  6 = agree very much

1. A job is what you make of it.

2. On most jobs, people can pretty much accomplish whatever they set out to accomplish.

3. If you know what you want out of a job, you can find a job that gives it to you.

4. If employees are unhappy with a decision made by their boss, they should do something about it.

5. Getting the job you want is mostly a matter of luck.

6. Making money is primarily a matter of good fortune.

7. Most people are capable of doing their jobs well if they make the effort.

8. In order to get a really good job you need to have family members or friends in high places.

9. Promotions are usually a matter of good fortune.

10. When it comes to landing a really good job, who you know is more important than what you know.

11. Promotions are given to employees who perform well on the job.

12. To make a lot of money you have to know the right people.

13. It takes a lot of luck to be an outstanding employee on most jobs.

14. People who perform their jobs well generally get rewarded for it.

15. Most employees have more influence on their supervisors than they think they do.

16. The main difference between people who make a lot of money and people who make a little money is luck.
IV. Directions: Please rate the extent to which each of the following items describes your current job by writing in your response to the left of the statement. (1 = not at all, and 7 = very much).

    not at all 1 2 3 4 5 6 7 very much

1. Information is unreliable.
2. Time is not available.
3. Consequences are unknown.
4. Improper design instructions.
5. Little decision input.
6. Little time to learn details.
7. Resources inadequate.
8. Quality standards are unknown.
9. Lead engineer is unpredictable.
10. Lack of technical feedback.
11. Unrealistic expectations.
12. Improper training preparation.
13. Decisions are not influential.
14. Lack of support in making decisions.
15. Demands can't be met.
16. Information is contradictory.
17. Job is fatiguing.
18. Conflicts with colleagues.
19. Control is beyond decision maker.
20. Unexpected emergencies.
21. Future plans are unpredictable.
22. Must meet schedules.
V. Directions: These items deal with the support you receive from the people around you. Use the following scale to answer each question:

0 = don't have any such person  1 = not at all  
2 = a little  3 = somewhat  4 = very much

1. How much does each of these people go out of their way to do things to make your work life easier for you?

__(A) Your immediate supervisor (boss)...
__(B) Other people at work...
__(C) Your spouse, friends, and relatives...

2. How easy is it to talk with each of the following people?

__(A) Your immediate supervisor (boss)...
__(B) Other people at work...
__(C) Your spouse, friends, and relatives...

3. How much can each of these people be relied on when things get tough at work?

__(A) Your immediate supervisor (boss)...
__(B) Other people at work...
__(C) Your spouse, friends, and relatives...

4. How much is each of the following people willing to listen to your personal problems?

__(A) Your immediate supervisor (boss)...
__(B) Other people at work...
__(C) Your spouse, friends, and relatives...
VI. Directions: These questions concern different aspects of your job. Write the number of your response to the left of each question.

For these questions, use the following scale:

very little  a moderate amount  very much
1          2          3          4          5

1. How much variety is there in your job?
2. How much are you left on your own to do your own work?
3. How often do you see projects or jobs through to completion?
4. To what extent do you find out how well you are doing on the job as you are working?
5. How much opportunity is there to meet individuals whom you would like to develop friendship with?
6. How much of your job depends upon your ability to work with others?
7. How repetitious are your duties?
8. To what extent are you able to act independently of your supervisor in performing your job function?
9. To what extent do you receive information from your supervisor on your job performance?
10. To what extent do you have the opportunity to talk informally with other employees while at work?
11. To what extent is dealing with other people a part of your job?
12. How similar are the tasks you perform in a typical work day?
13. To what extent are you able to do your job independently of others?
Please rate the degree to which each statement applies to your current job by writing the number of your response to the left of each question. Please use the following scale for these statements.

minimum amount moderate amount a maximum amount
1 2 3 4 5

14. The feedback from my supervisor on how well I'm doing.
15. Friendship from my co-workers.
16. The opportunity to talk to others on my job.
17. The opportunity to do a number of different things.
18. The freedom to do pretty much what I want on my job.
19. The degree to which the work I'm involved with is handled from beginning to end by myself.
20. The opportunity to find out how well I am doing my job.
21. The opportunity in my job to get to know other people.
22. The amount of variety in my job.
23. The opportunity for independent thought and action.
24. The opportunity to complete work I start.
25. The feeling that I know whether I am performing my job well or poorly.
26. The opportunity to develop close friendships in my job.
27. Meeting with others in my work.
28. The control I have over the pace of my work.
29. The opportunity to do a job from the beginning to end (i.e., the chance to do a whole job).
30. The extent of feedback you receive from individuals other than your supervisor.
VII. The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought in a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate. Please indicate your answer by putting a number in the blank to the left of the question.

For each question choose from the following alternatives:

0 = never  1 = almost never  2 = sometimes  3 = fairly often  4 = very often

1. In the last month, how often have you been upset because of something that happened unexpectedly?

2. In the last month, how often have you felt that you were unable to control the important things in your life?

3. In the last month, how often have you felt nervous and "stressed"?

4. In the past month, how often have you dealt successfully with irritating life hassles?

5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?

6. In the last month, how often have you felt confident about your ability to handle your personal problems?

7. In the last month, how often have you felt that things were going your way?

8. In the last month, how often have you found that you could not cope with all the things that you had to do?

9. In the last month, how often have you been able to control irritations in your life?

10. In the last month, how often have you felt that you were on top of things?

11. In the last month, how often have you been angered because of things that happened that were outside of your control?
0 = never  1 = almost never  2 = sometimes  3 = fairly often  4 = very often

12. In the last month, how often have you found yourself thinking about things that you have to accomplish?

13. In the last month, how often have you been able to control the way you spend your time?

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

If you still have some time left, please answer the following questions.

1. How does a security clearance affect your job?

2. What are the major stressors in your work?

3. How do you cope with them?

4. What are the major time management problems in your work?

5. How do you cope with them?
6. When does your work go really well?

7. When does your work go really badly?
Table 1

Reliability Information for Measures Used in The Engineering Stress Questionnaire

<table>
<thead>
<tr>
<th>Scale/Developer</th>
<th>Construct</th>
<th>Coefficient Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress Diagnostic</td>
<td>Occupational Stress</td>
<td></td>
</tr>
<tr>
<td>Survey/Ivancevich &amp;</td>
<td>Rewards</td>
<td>0.74</td>
</tr>
<tr>
<td>Matteson (1982)</td>
<td>Participation</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>Supervisory Style</td>
<td>0.74</td>
</tr>
<tr>
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### SDS, WLOC, JDIE, SS, JCI, PSS

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<td>-.60+</td>
<td>-.30#</td>
<td>.61+</td>
</tr>
<tr>
<td>-.40+</td>
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<td>-.60+</td>
<td>1.00</td>
<td>.46+</td>
<td>-.56+</td>
</tr>
<tr>
<td>-.37+</td>
<td>-.29#</td>
<td>-.30#</td>
<td>.46+</td>
<td>1.00</td>
<td>-.28#</td>
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<tr>
<td>.60+</td>
<td>.29#</td>
<td>.61+</td>
<td>-.56+</td>
<td>-.28#</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* = No significant correlation

# = p < .05

+ = p < .01

**Note.** Rewards - rewards for job performance.

Part - participation.

Supstyle - quality of supervision.

Roleamb - role ambiguity.

Rolecon - role conflict.

*table continues*
Overquan - quantitative overload.

Overqual - qualitative overload.

Timepres - time pressures.

SDS - sources of stress.

WLOC - work locus of control.

JDIE - job difficulty for engineers.

Boss - support received from boss.

Cowork - support received from coworkers.

Family - support received from family.

SS - overall social support.

Variety - variety in job.

Autonomy - independence in how job is performed.

Feedback - feedback received about job performance.

Dealwith - extent to which job involves dealing with others.

TaskID - task identity.

JCI - overall job characteristics.

PSS - perceived stress.

Many variables were omitted because correlations were non significant.
References


Handy, C. (1978). The family: Help or hindrance? In C. L. Cooper and R. Payne (Eds.), *Stress at work* (pp. 107-123), New York: John Wiley & Sons, Ltd.


