# Job Design and Job Stress:

# A Theoretical Examination and An Empirical Test

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## Abstract

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During the last two decades, job stress has been of great interest to both academic researchers and practicing managers. Many studies have examined the effects of job stress on employees' well-being and organizational effectiveness. Some research has also examined individual differences in reactions to stress. The majority of the job stress research has been dominated by the constructs role ambiguity and role conflict. Although this work has proven useful, it has overlooked the more basic (and more objective) qualities of job design that can be used to describe all jobs.

This dissertation aims to address this deficiency by providing a new model of (micro-level) job design and stress. This model highlights the linear and curvilinear relationships between job characteristics and stress, the interactive effects of job design and personal characteristics on stress, the interactive effects of job content and context on stress, and the mediating effects of role stressors in job design-stress relationships.

This model suggests a U-shaped curvilinear relationship between job complexity and stress. Stress will likely occur when the job is too simple or too complex compared with the individual's preference. This model also examines the interactive effects of job content and job context on stress. It hypothesizes that the combination of low job complexity and unsatisfactory job context will create a higher level of stress than expected by their additive effects. Further, role ambiguity and role conflict are proposed as mediator variables in this model. They are functions of job design and predictors of stress.

An empirical test of the proposed model was conducted. The results indicated a U-shaped curvilinear relationship between job complexity and stress. Job content and context had main effects and interactive effects on stress. Personal characteristics, such as ability and needs, moderated the relationship between job design and stress. Further, although the correspondence of job characteristics-role stressors-stress was not exactly as outlined by the model, the mediating effects of role ambiguity and conflict were supported.

To my parents

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# Chapter One

# Job Design and Job Stress Literature

As two research areas in management, job design and job stress have attracted tremendous attention, however, the relationship between job design and job stress has not been systematically examined. It has been acknowledged that both job design and job stress are closely related to the quality of working life. It is often perceived that job design can be an important determinant of job stress. While the role stress construct has been the major conceptual paradigm and methodological means of job stress literature, the impact of job design on stress has been overlooked to a large extent.

This study examines the relationship between job design and job stress. This chapter reviews the models or theories of job design and job stress that researchers and practitioners have tended to use at different stages in the evolution of management thought. It consists of three sections. The first section reviews the literature on job design; the second section reviews the studies of job stress; and the third section introduces the research on the relationship between job design and stress. Critical evaluations on the conceptualizations and empirical work in this field are presented at the end of each section.

## 1.1. Job Design

Job design refers to the overall set of job-related activities performed by an employee. This thesis highlights two important aspects of job design: job content and job context. Job content refers to the specific attributes or dimensions of a job. Job context refers to the immediate environment surrounding a job. Job design has been a primary research topic in organization studies because of its importance to organizations as well as to individuals. From the individual perspective, a job represents one of the most fundamental parts of working life. The

quality of working life is closely related to employee well-being. From the organizational perspective, job design is an essential determinant of productivity and employee satisfaction.

Six major models/theories are reviewed: the traditional model, the human relations model, the motivation-hygiene theory, the job characteristics model, the social information processing model, and the multi-disciplinary approach to job design.

### 1.1.1. The Traditional Model

The traditional model of job design is associated with Frederick Winslow Taylor's scientific management theory (Taylor, 1911, 1967). Taylor (1967, p36-37) introduced four principles of scientific management:

1. Develop a 'science' for every job. This science should include such things as rules of motion, standardized work implementation, and proper working conditions.
2. Carefully select workers who have the right ability for the job.
3. Carefully train these workers to do the job; then offer them proper incentives to complement job performance.
4. Support the workers by taking responsibility for work planning and by smoothing the way as they go about their jobs.

The major objective of Taylor's principles is production efficiency. The implication of his principles for job design is standardization of work process and specialization of task design. The job scopes were narrowed under the influence of Taylor's theory.

### 1.1.2. The Human Relations Model

The human relations model represents a humanist orientation of job design. It emphasizes employee cooperation and morale. Mayo extended the concept of social man, who is motivated by social needs and interpersonal relationships, to replace the concept of rational man motivated by economic needs (Mayo, 1953; Roethlisberger & Dickson, 1939). The salient points of this theory are that managers must recognize workers' social needs and must use the informal group at the work place as a positive

force for accomplishing organizational objectives. The human relations model led to the development of a large body of literature referred to as the "human relations movement", a movement concerned about the good relationship between managers and their subordinates. Under the influence of the human relations model, the focus of job design has shifted from physical working process and monetary incentives, towards the social settings of workers and their attitudes.

### 1.1.3. The Motivation-Hygiene Theory

The motivation-hygiene theory, introduced by Herzberg (Herzberg, Mausner, & Snyderman, 1959; Herzberg, 1966), attempts to differentiate the causes of job satisfaction and dissatisfaction. According to this theory, job satisfaction results from satisfier such as achievement, recognition, responsibility, and the job itself. Job dissatisfaction comes from hygiene factors such as physical working conditions, job security, benefits, and salary. Hygiene factors, when appropriately provided, can serve to remove job dissatisfaction and improve performance to a certain extent. To pursue higher levels of performance, managers have to use motivators to stimulate their employees. Although the differentiation of satisfier and hygiene factors has failed to receive sufficient empirical support, the motivation-hygiene theory has led to the development of job enrichment -- a revolutionary reform in the practice of job design. The essence of job enrichment is to enrich the content of jobs by including a greater variety of skills and knowledge, by giving workers more responsibilities and autonomy in job-related decision-making, and by providing them with more opportunities for personal growth and development.

### 1.1.4. The Job Characteristics Model

The impact of job characteristics on employees' attitudes and behaviour has become a popular topic of research in the past two decades. The most influential model has been the Job Characteristics Model (JCM, Hackman & Oldham, 1976). The JCM suggests that jobs can be characterized

by five core dimensions, skill variety, task identity, task significance, autonomy, and feedback. These job characteristics induce employees' psychological states (experienced meaningfulness, experienced responsibility, and knowledge of work results), which in turn lead to favourable work outcomes such as high job satisfaction, high growth satisfaction, high internal motivation, and better performance. The most important contribution of the JCM to the area of job design is that it summarizes and integrates a large amount of previous research by specifying the main features of jobs which affect employees' attitudes and behaviour. The five core job dimensions have been proven to be important factors in job design. Moreover, the JCM offers specific and testable propositions regarding the causality between these five job dimensions and outcome variables. This provides an extremely useful framework for further research. Hundreds of studies have used this framework and the Job Diagnostic Survey developed by Hackman and Oldham (1975). The validity of self-reported job rating has been generally satisfactory (Fried & Ferris, 1987; Gerhart, 1988).

Second, the JCM was developed and tested on a large and heterogeneous sample of individuals and jobs. It provides a conceptual framework for diagnosing and re-designing various jobs. From the practical standpoint, the generalizability of the JCM is high.

Third, the JCM suggests that the employees' psychological states mediate the relationships between job characteristics and outcome variables. The discovery of mediating effects in the JCM has enriched the understanding of causal structure inherent in the model. Among the several tests of the mediating effects of the psychological states, generally supportive results have been reported (i.e., Arnold & House, 1980; Hackman & Oldham, 1976; Johns, Xie, & Fang, 1992; Wall, Clegg, & Jackson, 1978).

Fourth, the JCM identifies the importance of individual differences in job design. Hackman and Oldham (1976) suggested that employees with high growth need strength should respond more positively to job complexity than employees with low growth need strength. Arnold and House (1980) supported the moderator effects of GNS on the relationship between job dimensions and psychological states. The interest in the moderating effects of individual differences in job design has been expressed by many researchers who have examined a variety of moderators, such as locus of control, knowledge and skills (Wanous, 1974), personal characteristics, context satisfaction and instrumentality of performance for pay and promotion (Johns et al., 1992). To bring the variables of individual differences into the literature and practice of job design, the JCM has made a significant contribution.

### 1.1.5. The Social Information Processing Model

Salancik and Pfeffer (1978) were among the first group of researchers who presented the social information processing model (SIP model) as an alternative view to the JCM. They claimed that task perception and affective responses were functions of social cues. According to Pfeffer (1981, p10), the four premises of the SIP model are as follows: "First, the individual's social environment may provide cues as to which dimensions might be used to characterize the work environment.....Second, the social environment may provide information concerning how the individual should weigh the various dimensions-whether autonomy is more or less important than variety of skill, whether pay is more or less important than social usefulness or worth. Third, the social context provides cues concerning how others have come to evaluate the work environment on each of the selected dimensions.....and fourth, it is possible that the social context provides direct evaluation of the work setting along positive or negative dimensions, leaving it to the individual to construct a rationale to make sense of the generally shared affective reaction." The major difference between the JCM and SIP model

is that the former assumes that employees perceive and react to an objective workplace reality whereas the latter suggests that workplace realities are at least partially constructed from information provided by the social context of the workplace.

### 1.1.6. Multi-disciplinary Approach to Job Design

The multi-disciplinary approach to job design has emerged in the 1980s. Campion and Thayer (1985) noted that different job design approaches are oriented towards the prediction of different categories of outcome. The motivational approach mainly predicts employees' attitudes. The mechanistic approach predicts work process efficiency. The biological approach is concerned with employee's physical efforts and working conditions, while the perceptual/motor approach is oriented towards employee's mental capacities and limitations. Campion and Thayer (1985) integrated these approaches and created a multi-disciplinary approach to job design.

The multi-disciplinary approach to job design differs from other approaches in three perspectives. First, most theories and models only focus on one theme of job design. For instance, the JCM emphasizes job content while the SIP model focuses on social context. The multi-disciplinary approach has broadened the research orientation by developing a multi-purpose measurement of job design and using it in empirical settings (Campion & Thayer, 1985; Campion, 1988; Campion & Berger, 1990) Second, other approaches have often employed various job characteristics to predict similar outcome variables, the multi-disciplinary approach employs different approaches to predict different categories of outcome. It enhances the clarification of causal path. Third, in contrast to the previous schools of thought, which commonly view job complexity as a leading factor to favourable outcomes for individuals as well as for organizations, the multi-disciplinary approach suggests job complexity may increase motivation while decreasing efficiency. It views job complexity from a more comprehensive perspective.

**Evaluation**

The review of the six theories/models of job design has led to several conclusions. First, the literature represents a historical evolution of managerial beliefs in job design. The evolution is characterized by a movement from an engineering orientation to a humanistic orientation. The emphasis of job design is changing from the job itself to an integrative consideration of task completion and job holders' psychological states. Job scopes were narrow under the influence of Taylor's scientific management theory. They have been enriched under the influences of motivation-hygiene theory and the JCM.

Second, in contrast to job content, which has been extensively examined, much less knowledge regarding job context has been accumulated. Even if Taylor's and Herzberg's theories are involved with both the content and context aspects of job design, the job context material of both theories attracted much less attention than did job content. As a matter of fact, there is evidence that jobs are embedded in a context largely defined by organizations and social factors, and job context has a strong influence on individual perceptions of jobs (Brass, 1981; Kozlowski & Hults, 1986; Oldham & Hackman, 1981; Roberts & Glick, 1981; Rousseau, 1978). Further research is necessary to investigate the relationship between job content and job context in job design.

Third, the literature on job design is mainly based on an organizational perspective rather than on the job holders' perspective. Tremendous attention has been paid to organizational outcome variables such as productivity and performance. Individual attitudinal variables have been examined only in relation to organizational interests. A great amount of research has been conducted concerning the job design-satisfaction-performance linkage. The relationships between job design and employee well-being variables, such as job stress, were less explored.

## 1.2. Job Stress

As an area of research, job stress is rooted in several fields, including medicine, clinical psychology, engineering psychology, and organizational psychology (Beehr & Franz, 1987). This thesis highlights the theoretical development and empirical research on job stress in the organizational behaviour literature.

In comparison to the literature on job design, which is characterized by well-established theories and models, the theoretical work of job stress is at a less developed stage. Ivancevich and Matteson have labelled stress as "the most imprecise (term) in the scientific dictionary" (1980 a, p5). Among various conceptualizations of job stress, Ivancevich and Matteson concluded three common ways of defining job stress: as an environmental stimulus to an individual; as an individual's response to the environmental force; or as the interaction between these two events. This literature review focuses on four schools of research from: 1) the organizational perspective, 2) the individual perspective, 3) the societal perspective, and 4) the interactive perspective. It is concerned primarily with the research published in the last fifteen years in North America.

### 1.2.1. Job Stress - An Environmental Stimulus -- Viewing Job Stress from the Organizational Perspective

Caplan, Cobb, French, Van Harrison and Pinneau (1975, p3) defined job stress as "**any characteristics of the job environment which pose a threat to the individual.**" This definition is representative to a school of conceptualization which views job stress as an environmental stimulus.

The theoretical foundation of this school of research is the demand-response theory of job stress. The demand-response theory considers job stress as a (perceived) substantial imbalance between demand and response capacity, under conditions where failure to meet demand has important (perceived) consequences (Kasl, 1978; McGrath, 1970). This school of research primarily focuses on the **demand** side of the demand-response

theory. It views job stress as an environmental characteristic which affects people adversely (Beehr, 1976; French & Caplan, 1972; Kahn, Wolfe, Quinn & Snoek, 1964). The role stress approach, developed by two groups of researchers from the University of Michigan (French & Kahn, 1962; Kahn et al., 1964), is the most representative of this school. This approach suggests that certain role stressors, such as role ambiguity, role conflict, and role overload, can lead to low job satisfaction, poor performance, psychological strains, and personal failure.

At least two hundred studies have examined the correlations between role stressors and affective outcomes (Ganster & Schaubroeck, 1991). Among numerous literature reviews and meta-analysis of the role stress theory (Jackson & Schuler, 1985; Schuler, Aldag & Brief, 1977; Van Sell, Brief, & Schuler, 1981), Jackson and Schuler's meta-analysis (1985) examined correlations between role ambiguity and conflict and ten organizational context variables, five individual characteristics, ten affective reactions, and four behavioral reactions. Role ambiguity and conflict were related to many organizational context variables and affective reactions. However, they were not related to personal characteristics. Moreover, the reported relationships between these two role stressors and behavioral variables, such as absence and performance, were relatively weak. Jackson and Schuler proposed that most of the relationships describing the potential causes and consequences of role ambiguity and conflict are likely to be influenced by moderator variables. Furthermore, they suggested reducing the impact of common method bias by adding objective measures in the study of job stress.

### 1.2.2. Job Stress - An Individual's Response to Environmental Force -- Viewing Job Stress from the Individual Perspective

This school views job stress mainly as an individual's response to environmental forces (Beehr, 1984; Caplan, Cobb & French, 1975; Kahn & Quinn, 1970). The response can be physical, psychological or behavioral.

They are all indicators of ill health and/or the well-being of an individual (Beehr & Franz, 1987).

The theoretical foundation of this school is the notion of situation-constraints. The situation-constraints hypothesis was proposed by Peters, O'Connor and Rudolf. Peters et al. (1980) discovered that conditions, such as the lack of job-related information, interacts with an employee's ability to affect performance. They, therefore, emphasized the importance of moderators in the job stress-strain relationship. Although Peters and his associates' model was not originally designed to examine the impacts of individual characteristics, "the situation-constraints hypothesis can be restated to describe the moderating effects of ability on the relationship between role clarity and performance." (McEnrue, 1984, p380)

The situation-constraints model of job stress consists of two elements: situations and constraints. The situation is the organizational context including various job stressors while the constraints are individual characteristics which determine the person's exposure, reaction, and tolerance to job stress. To view stress from the situation-constraints perspective, the situation is taken as given and it is the personal characteristics which lead to the differences in stress reaction. Since different people, characterized by diverse personalities, abilities, past experiences, needs, and gender, can perceive and/or react to the same stressor differently, individual differences became the target of interest in this school of thought.

Although the situation-constraints model has formed the theoretical foundation of this school, the actual examination of individual differences in job stress was stimulated by research development in other relevant fields, particularly the research of Type A behaviour in the behavioral medicine literature.

In the late 1950s, two cardiologists Ray Rosenman and Meyer Friedman (1959) observed that many coronary heart disease (CHD) patients shared a

characteristic pattern of behaviour that they labelled Type A behaviour. Friedman and Rosenman (1974) defined Type A behaviour as an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time. Rosenman and his colleagues (1975) followed 3,500 males in an 8.5-year study and confirmed the relationship between Type A behaviour and CHD.

Rosenman and Friedman's research encouraged researchers in organizational studies to explore this area. Since Type As have stronger cardiovascular, neuroendocrine, and psychological responses to certain stimuli than Type Bs, it became logical to assume that Type As should react more strongly to work stressors than Type Bs. A vast amount of research has been conducted to examine the differences between Type As and Bs in social, behavioral, and work-related domains. Notable empirical support was reported (Chesney & Rosenman, 1980; Howard, Cunningham, & Rechnitzer, 1986; Hurrell, 1985; Ivancevich, Matteson, & Preston, 1982; Jamal, 1985 b; Jamal & Ahmed, 1985; Matteson & Ivancevich, 1982). In particular, the Type A behaviour pattern has been associated with increased job demand such as role overload, role ambiguity, role conflict, longer working hours, more control or influence at work, and lower job and life satisfaction. Other personal characteristics which have been examined as moderators in stressor-stress relationships include locus of control, tolerance to ambiguity, needs, ability, and gender.

### 1.2.3. Job Stress - The Result of Buffering Effects -- Viewing Job Stress from the Societal Perspective

This school of study focuses on the social factors which reduce and/or eliminate the negative effects of stress in the work place. The dominant hypothesis has been that social support buffers the impact of stressors on stress.

The buffer hypothesis was first defined by Caplan, Cobb, French, Van Harrison and Pinneau (1975) to explain interactions between job stressors

and social support. It proposes that the relationship between stressors and stress is stronger for persons with lower levels of social support than for those with higher levels of social support. Social support was conceptualized as including both helpful activities of others and ease of communication with others. Caplan et al. (1975) differentiated the supervisor, co-worker, and family members as distinct sources of social support. The theoretical construct of the buffer hypothesis has been refined in numerous studies (Cohen & Wills, 1985; French & Caplan, 1970; Himle, Jayaratne, & Thyness, 1989; LaRocco, House, & French, 1980).

In this school of study, both environmental force and individual response are taken as given. It is the social surroundings of the individual that play the essential role in determining the individual's perceived stress level. That is, presumably stressful job situations may not result in stress if the individual has supportive associates, but they may have detrimental effects for those who lack social support. Therefore, job stress can be viewed as a result of confrontation of two groups of environmental force: stressors and social support.

### 1.2.4. Job Stress - The Result of Misfit Between Person and Environment -- Viewing Job Stress from An Interactive Perspective

The original P-E fit theory was developed by psychologists Lewin (1938) and Murray (1938). The P-E fit theory was first brought into the field of job stress by French, Rogers, and Cobb (1974) and French (1974), and further refined by Caplan et al. (1975), French, Caplan, and Van Harrison (1982), and Van Harrison (1978). This theory states that "occupational stress is the result of a lack of fit between the demands of the job and the worker's skills and abilities, and/or a lack of fit in the degree to which the job supplies the worker's personal needs." (Chesney & Rosenman, 1980, p203) It suggests that the lack of fit leads to psychological distress (job dissatisfaction, depression, and anxiety) or pathophysiological problems (such as coronary heart disease). An interactive perspective of job stress has emerged.

French et al. (1982) provided the most comprehensive treatment of P-E fit approach. Their treatment involved two versions of P-E fit. One version emphasized the fit between environmental supplies and personal values, goals, and motives (S-V fit). The other focused on the fit between environmental demands and personal abilities and skills (D-A fit). French et al. (1982) suggested that personal characteristics (P) and work environment (E) can be described both objectively and subjectively. The subjective (perceived) S-V or D-A misfit would lead to stress.

The conceptualization of S-V fit and D-A fit has been expanded by Schuler (1980 a) and McGrath (1976). However, as was pointed out by Edwards and Cooper (1990), the conceptual and empirical distinctions of S-V fit and D-A fit have been neglected by other researchers to a large extent. Hence, rigorous tests of S-V fit and D-A fit have been rare. One of the comprehensive tests of the P-E fit and stress was conducted by Caplan and his associates (1975). Their study was based on a sample of 2,010 participants from 23 occupations. Three sets of variables were measured: job stressors, strain, and personal characteristics. Job stressors included 23 variables such as complexity of work, work load, role stressors, and participation. Strain was measured by physiological and psychological data. Caplan et al. found that the P-E fit was a stronger predictor for strain than either job stressors or demographic/personality variables.

The effects of D-A fit have been examined in a number of studies. In Coburn's study (1975), D-A fit was measured by comparing the worker's actual educational level and the objective requirement of education for his or her job. The objective requirement of education for a specific occupation was designed by the US Department of Labour Listing of Job General Education. Coburn (1975) found that workers who had too low or too high an education for the jobs they held reported higher levels of job dissatisfaction and poorer physical health than those whose educational levels 'fit' the requirements of their jobs. The notion of D-A fit was

supported. Similarly, McGrath's (1976) model of job stress indicates that job stress results from perceived environmental demand which threatens to exceed the person's ability. Tetrick and LaRocco (1987) found that ability moderated the relationships between role stressors and psychological well-being. Further, they found a direct, negative relationship between ability and stress.

A representative stream of job stress research has employed the notion of P-E fit to examine the joint effects of stressors and personal characteristics on stress. The joint effects of Type A behaviour pattern and role stressors on stress have been supported in many studies (Ganster, 1987; Ivancevich et al., 1982; Jamal & Ahmed, 1985; Jamal, 1985 b, Jamal, 1990; Orpen, 1982).

Matteson and Ivancevich (1982) conducted an interesting study to examine the effects of individual and organizational fit. In addition to the classification of employees into Type As and Bs, they classified organizations into Type As and Bs according to organizational climate and personality. Type A organizations are authoritarian and conservative while Type Bs are supportive and creative. Matteson and Ivancevich found that Type B employees in Type B organizations reported the fewest negative symptoms. Whereas, Type As in Type A organizations reported the most. Type Bs in Type A organizations and Type As in Type B organizations reported intermediate levels of symptoms.

In a meta-analysis, Frone (1990) found intolerance of ambiguity moderated the relationship between role ambiguity and stress. The positive relationship between role ambiguity and stress was substantially stronger for those who were intolerant to ambiguity than for those who were tolerant to ambiguity.

To summarize the research of P-E fit/misfit, a vast amount of research has employed the P-E fit notion as a theoretical guide rather than as a rigid model. Limited efforts have been devoted to differentiate S-V fit and D-A fit conceptually and empirically. As was pointed out by

Ganster and Schaubroeck (1991), proper conceptualization and rigorous tests of the P-E fit theory are necessary in job stress literature.

**Evaluation**

The job stress research is full of difficulties and yet very attractive. The difficulties are mainly derived from two features: the enormous variance in job holders' perceptions, tolerances, and reactions to job stress and the variance in researchers' conceptualizations of job stress. The attractiveness stems from the fact that there are so many unsolved problems existing in this field which offer great potential for exploration.

This chapter reviews four distinctive and inter-related schools of job stress: viewing job stress from the organizational perspective, the individual perspective, the societal perspective, and the interactive perspective. Each school has made a valuable contribution to job stress literature. Taken together, they are integrated by the interactive school.

The widespread acceptance of the interactive school of job stress is mainly due to two reasons. First, this school incorporates macro and micro aspects of job stress. On one hand, it examines job stress from a social perspective. The variables such as social support, social information, and cultural differences are often tested as moderators in the studies of P-E fit. On the other hand, it explores job stress from an individual perspective. Knowledge has been accumulated regarding people's similarities and differences in perceptions, tolerances, and reactions to stress. Second, this school integrates the essence of alternative schools. It views person and environment as joint determinants of job stress. It provides potential to overcome the shortcomings of the other schools which either focus on the personal or environmental aspects of job stress. The interactive school has made a significant contribution to bring the study of job stress into an integrated and dynamic phase.

## 1.3. Research on the Relationship Between Job Design and Job Stress

It is widely acknowledged that people's jobs can impact their physical and emotional well-being. However, job design has seldom been examined as a source of job stress. As pointed out by Jackson and Schuler (1985), there is no well-developed theory relating job design to job stress. The empirical research has been intuitive and fragmented. Accordingly, limited literature reviews and meta-analysis are available.

This review examines five approaches to the study of the relationship between job design and job stress. The first approach considers job design and job stress as related to one another without any causal analysis. The second approach views job design as an antecedent of job stress. The third approach regards job design and role stressors as two sets of antecedents of stress, each independent of the other. The fourth approach examines the interactive effects of job design and role stressors on job stress. The fifth approach investigated the interactive effects of job characteristics on stress.

### 1.3.1. Job Design and Job Stress: Two Correlated Constructs

The correlational research on job design and job stress has not typically been theory driven. "The most popular assumption seems to be that job and task characteristics are determinants, or at least, antecedents, of role ambiguity and role conflict." (Jackson & Schuler, 1985, p28) Strength and direction of the relationships between job characteristics and role stressors have been the major interests. This type of study can be regarded as a preliminary investigation which lays groundwork for further causal studies. Due to the nature of fragmented research in this field, the review of the correlational studies is based on the individual job characteristics and their correlates.

<u>Skill variety</u>

Widely diverse results were reported regarding the correlation between skill variety and role conflict. Brief and Aldag (1976) suggested that jobs with high role conflict should also require a wider range of

skills. Their proposition was supported in the studies of Naughton (1989) and rejected in Moorhead's study (1981). Moorhead asked a group of administrators to assess physicians' skill variety and correlated the reported data with the physicians' role conflict. A negative correlation between skill variety and role conflict (r=-.48) was reported. Other researchers reported no relationship between skill variety and role conflict (Keller et al., 1977; Schuler et al., 1977). The reported correlations between skill variety and role ambiguity have been much more consistent across different studies than those relating to role conflict. In general, weak negative correlations were found (Brief & Aldag, 1976; Naughton, 1989; Schuler et al., 1977), whereas Moorhead (1981) found a positive correlation between these two variables.

Task identity

Task identity refers to the extent to which a person can complete his/her task as a whole. Task identity tends to be negatively correlated with role conflict and ambiguity (Keller et al., 1977; Schuler et al., 1977; Walsh et al., 1980). The negative correlation between task identity and role ambiguity was often attributed to the fact that a high level of task identity leads to the employees' awareness of how he/she fits in an organizational scheme, thus reducing role ambiguity. However, very little explanation has been made regarding the negative correlation between task identity and role conflict. Further, Spector and Jex (1991) reported negative associations between identity and frustration and between identity and anxiety.

Task significance

Very little effort has been devoted to examine the relationship between task significance and job stress. Naughton (1989) investigated this relationship using within and between occupation analyses. The former examined the differences between each individual's perception and the mean of the occupation, while the latter investigated the cross-occupational difference in stress reaction. More than 1,000 participants

from 45 occupations took part in this study. In Naughton's between-occupational analysis, task significance showed a positive relationship with role conflict and no relationship with role ambiguity. In his within-occupational analysis, task significance showed a negative relationship with role ambiguity and no relationship with role conflict. It seems that the more the individual's job could influence the life of other people, the less role conflict and the more role ambiguity he/she would likely experience. In Maslach and Jackson's study (1981), the correlation of task significance and emotional exhaustion was not significant. Spector and Jex (1991) found that task significance was positively associated with anxiety, frustration, and health symptoms.

Autonomy

Consistent results were reported regarding the negative correlation between autonomy and role ambiguity (Brief & Aldag, 1976; Keller et al., 1977; Naughton, 1989; Schuler et al., 1977; Walsh et al., 1980). The relationship between autonomy and role conflict seems to be rather small (Brief & Aldag, 1976; Moorhead, 1981). Some studies even reported significantly positive correlation (Jackson, Schwab, & Schuler, 1986; Naughton, 1989). Spector, Dwyer, and Jex (1988) investigated the relationship among numerous job stressors and stress. Their data of job stressors was collected through two sources: the job incumbent (female secretaries) and their supervisors. Convergent and discriminant validities were found for four stressors (autonomy, working hours, work load, and number of people worked for), but not for three others (role ambiguity, constraints, and interpersonal conflict). Using the measurement of autonomy developed by Hackman and Oldham (JDS, 1975), Spector et al. found that autonomy was negatively related to anxiety, frustration, and intention to quit the job. Meanwhile, autonomy was negatively associated with role ambiguity. No significant relationship was found between autonomy and role conflict. A similar result was reported in another study by Spector and Jex (1991).

Feedback from others and from the task

The reported relationship between feedback and role ambiguity has been consistently negative (Brief & Aldag, 1976; Naughton, 1989; Schuler et al., 1977; Summers, Denisi, & DeCotiis, 1989; Walsh et al., 1980). However, less evidence is available for role conflict. While some researchers reported negative correlation between feedback and role conflict (Schuler et al., 1977; Summers et al., 1989), others reported no relationship (Naughton, 1989; Vredenburgh & Trinkaus, 1983). Maslach and Jackson (1981) reported significant negative correlation of feedback and emotional exhaustion. In the study by Russell et al. (1987), the teachers who received positive feedback from others, concerning their skills and abilities, were less vulnerable to burnout.

Participation in decision-making

Researchers have found a negative relationship between participation in decision-making and role stressors (Beehr, Walsh, & Taber, 1976; Caplan et al., 1975; French & Caplan, 1972; Jackson, 1983; Jackson et al., 1986; Karasek, 1979; Moorhead, 1981; Nicholson & Goh, 1983; Schuler, 1980 b; Summers et al., 1989; Teas, Wacker, & Hughes, 1979; Van Sell et al., 1981). Morris, Steer and Koch (1979) examined the correlations between six structural features and role ambiguity and conflict. Only PDM was found to be consistently related to role ambiguity and conflict for three occupational groups (professional, blue collar, and secretarial).

### 1.3.2. Job Design as an Antecedent of Job Stress

#### (1) Enriched job content reduces stress

Participation in Decision-Making (PDM)

The proposition that PDM reduces individuals' stress levels is rooted in the belief that personal control determines reactions to stressors (Miller & Norman, 1979). Karasek (1979) suggested that PDM enables workers to remove obstructions to effective performance, thereby reducing their frustration and strain. In other words, PDM enhances one's ability to influence his or her environment, thus reducing stress.

Jackson (1983) proposed an alternative view. She considered PDM as a source of information which increases communication. The increased communication, in turn, enhances one's accurate knowledge of role expectation, thus reducing role ambiguity. Furthermore, PDM has been hypothesized as a source of social support, which improves interpersonal relations within a work unit, and hence, reduces job strain (Caplan, et al., 1975).

The causal effects of PDM on stress have been examined by several studies (Coch & French, 1948; French & Caplan, 1972; French, Israel, & As, 1960; Jackson, 1983). Most of the above were experimental studies. They differed from the correlational research by testing the causality between job characteristics and stress. For instance, Jackson (1983) conducted a field experiment to examine the effects of PDM over a six-month period. PDM showed a negative effect on role ambiguity and conflict. These two role stressors were positively associated with emotional strain, job dissatisfaction, and turnover intention.

**(2) Unsuitable job context leads to job stress**

Shift Work

Shift work is an element of job context which measures the rotating nature of the job. The theoretical basis of viewing shift work as being a stressor is that employees' participation in routine or non-routine shifts influences their perceptions of the quality of their working life. "Routine Shift serves to provide the necessary energy, both psychic and otherwise, to innovate and express oneself to the fullest potential in terms of work content with attendant improvement in both quality of working life and work performance." (Baba & Jamal, 1989, p680)

The effects of shift work on workers' physical and mental health has been examined by Jamal and his colleagues since 1976 (Baba & Jamal, 1989; Frost & Jamal, 1979; Jamal, 1981; Jamal & Jamal, 1982; also see the McReynolds's report (1985) of Jamal's work). These studies reported ill effects of shift work on workers' psychological and physical health.

Shift workers tend to participate less in social activities and report higher levels of physical and mental illness symptoms than non-shift workers. They are also less productive. Supportive research has been provided by others (Coffey, Skipper & Jung, 1988; Moore-Ede & Richardson, 1985; Poulton, 1978). Some research even reported lagged psychological and psychosomatic symptoms of former shift workers (Frese & Okonek, 1984). Baba and Jamal (1989) compared the effects of routine and non-routine shifts and found that three-shift rotations or non-routine shifts are particularly harmful. Non-routine shift workers reported significantly higher levels of role ambiguity, role overload, and lower levels of job satisfaction and organizational commitment than routine shift workers. In addition, non-routine shift workers tended to have higher levels of turnover intention and lower levels of performance than their routine shift counterparts. Two insights arise from this research. First, the essence of the question is whether or not the shift is routine, rather than on whether or not the job is on shift. Therefore, the examination of job context should be based on more fundamental aspects, such as how job context factors influence the worker's control over the environment, rather than on the surface of job context variables per-se. Second, workers' perceptions of job content may be influenced or shaped by their perceptions of job context, which calls further attention to an interactive examination of job content and context.

Physical Working Conditions

Poor physical working conditions are potential stressors for workers, especially for blue collar workers. Poulton (1978) examined which physical working conditions may actually lead to stress. Poor visibility, heat, cold, wind, harmful atmospheric pollution, and perceived danger were identified as potential stressors. Among these conditions, however, some appear to be needed, to a certain extent, in order to increase efficiency and to keep workers alert; whereas others, such as pollution and gusty winds, are typically harmful stressors which are not

needed at all. Poulton's study suggests an important fact: the relationship between stressor(s) and stress can be linear as well as curvilinear. The pattern of the relationship is determined by the nature of the stressors and the level of physical and psychological tolerance of the individual.

### 1.3.3. Job Design and Role Stressors as Antecedents of Job Stress

The theoretical foundation of this group of research is similar to the studies examining either job design or role stressors as antecedents of stress-related outcomes. The uniqueness of this group of studies is that they have developed comprehensive models to include job design and role stressor(s) as causal factors of stress. In these models, job design and role stressors are regarded as two sets of independent antecedents, each leading to job stress-related outcomes.

Baba and Harris (1989) developed a model to describe the relationship between stressors, stress and absence. The role stressors (role ambiguity, conflict and overload), work stressors (PDM, autonomy, challenge and responsibility) and non-work stressors (stressful life events), were measured as independent variables. Stress was hypothesized to mediate the relation between stressors and absence. Individual characteristics and organizational culture regarding absence were the hypothesized moderators. This model was partially supported. In the comparison of predictive power between different stressors, the most important predictor was stressful life events from the set of non-work stressors, followed by role stressors. The work stressors appeared to be weaker predictors of stress.

Parker and DeCotiis (1983) proposed another model of job stress. The work itself, organizational characteristics, role in the organization, relationships, and career development are stressors. The first-level outcome is stress (measured by time stress and anxiety). The second-level outcomes are employee attitudinal variables and performance. They found that all sets of stressors played significant causal roles to stress.

Comparing the predictive power among the six sets of stressors, organizational characteristics showed the highest relationship with time stress and the second highest with anxiety. Work itself had the second highest relationship with time stress and the third highest with anxiety. Moreover, only part of the variables in each set were proven to be significant predictors. For instance, autonomy significantly predicted job stress, whereas task variety and PDM did not. Even role ambiguity was not related to stress reaction. In addition, some stressors were related to one form of stress, but not both.

In French and Caplan's study (1972), the role stressors and job stressors (responsibility, relations with others, PDM, and occupational differences) were employed to predict individuals' strains and coronary heart disease. Significant causality of role stressors to stress was reported. However, the relations between job stressors and stress appeared to be complicated. Two job stressors, responsibility and bad relationships with others, were associated with stress. Whereas, PDM was related to reduced stress. This study further revealed the complexity of the relationship between job design and stress. The above-cited studies are representative ones in this field, but other relevant research is also available (Beehr, et al., 1976; Beehr & Newman, 1978; Pinder & Schroeder, 1987).

In a recent study by Kelloway and Barling (1991), role stressors and job characteristics were found to be two sets of independent variables of stress. However, their linkages with stress were mediated by other factors. The relationship between job characteristics and stress was mediated by subjective competence (personal accomplishment at work). The relationship between role stressors and stress was mediated by job-related affective well-being (work satisfaction, emotional exhaustion, and depersonalization).

### 1.3.4. Job Design and Role Stressors as Interactive Antecedents of Job Stress

This group of research predicts job stress from the interactive effects of job design and role stressors. It postulates that job stress may be a function of an interaction of job content, context, and/or role stressors. Although job content, job context, and role stressors have all been tested as moderator variables in different studies, the typical approach is to view job design as a moderator which determines the direction and strength of the effects of role stressors on stress (Abdel-Halim, 1978, 1981; Beehr, 1976; Tosi, 1971). The theoretical foundation is that if role expectation is stressful, people with higher levels of job complexity can define their own role expectation, therefore, they will experience lower stress than those whose jobs are low in job complexity.

**(1) Job Content Variables as Moderators**

Individual job characteristics

In the past two decades, researchers often employed role stressors as antecedents of stress, and job characteristics as moderators in the relationship between role stressors and stress. Abdel-Halim (1978) postulated that individuals in jobs with greater task variety may be able to cope better with role stressors than those whose jobs entailed less variety. Other studies reported that employees with autonomy were better able to cope with stress (i.e., Beehr, 1976).

Participation in decision-making (PDM) may interact with role stressors to affect performance and satisfaction differently at different organizational levels. Schuler (1977 b) reported that both role ambiguity and role conflict interact with participation at lower organizational levels to influence satisfaction and performance. At higher and middle organizational levels, role ambiguity (rather than conflict) interacts significantly with participation to influence satisfaction (but not performance).

Summary measures of job design

Another approach of testing the moderating effects of job content is to employ the summary measure-job complexity. Abdel-Halim (1981) suggested that the negative effects of role ambiguity and conflict are significantly greater under conditions of high task complexity than under conditions of low task complexity. This hypothesis is unique because it proposes a 'negative' moderating effect of job complexity in the relationship between role stressors and outcomes. Furthermore, it pinpoints the possibility that the moderating role of an overall level of job complexity might differ from those of individual job characteristics.

**(2) Job Context Variables as Moderators**

Organizational Structure

Organizational structure has often been tested as a moderator in the stressor-stress relationship (Crozier, 1964; Drabek & Hass, 1969; Kahn et al., 1964; Moch et al., 1979; Morris, et al., 1979; Schuler, 1977 c; Van Sell et al., 1981). Nicholson and Goh (1983) focused on when and how organizational structure moderates the effects of role stressors. They hypothesized that a formulated organizational structure enhances the relation between role conflict and structure variables and decreases the relation between conflict and interpersonal variables. On the other hand, in organizations with an informal and unstructured environment, role conflict is likely to be related to interpersonal variables and unrelated to structure variables. These hypotheses were partially supported. Kozlowski and Hults (1986) examined the moderating role of work context in the task complexity-job performance relation. They suggested that task complexity should have little direct effect on outcome variables. Its effects are moderated greatly by the work context in which jobs are embedded. In the research of Gaines and Jermier (1983), emotional exhaustion was found to be the result of three sets of factors: employees' personal characteristics, interpersonal milieu, and the work itself. Moreover, it was profoundly affected by the job context such as

administrative policies and practices.

Physical Working Conditions

In a study of school teachers' stress, Russell, Altmaier and Van Velzen (1987) defined overcrowded classrooms and involuntary transfers as typical contextual stressors among teachers. They found that an interaction of marital status and average class size was predictive of teachers' emotional exhaustion and burnout.

**(3) Job Content and Job Context as Moderators**

In the Role Episode Model developed by Kahn et al., (1964), role messages are independent variables while one's experience and response are dependent variables. Organizational factors, personal factors, and interpersonal factors are moderators. The organizational factors cover both content and context aspects, such as structure, level, role requirement, task, and physical settings. Van Sell et al. (1981) suggested that role ambiguity and conflict are partially a function of interaction of job content, organizational structure, physical settings, and practice. Schuler (1977 c) argued that it is the 'fit' between task, organizational structure, and technology that determines role ambiguity and conflict. Meanwhile, task and structure each makes an independent contribution to job stress. Similar interaction hypotheses have been proposed and tested by others (Moch et al., 1979; Morris et al., 1979; Rogers & Molnar, 1976).

**(4) Role Stressors as Moderators**

A unique way to examine the interaction hypothesis is to assume that role stressors moderate the job design-stress relationship. Sutton and Rafaeli (1987) investigated the joint effects of role overload and physical working conditions, such as noise, heat, cold, lighting, density, and control over privacy on clerical workers' stress. A surprising finding was reported. Employees experiencing high role overload had few negative reactions to poor physical working conditions. Sutton and Rafaeli pointed out that overloaded employees had to concentrate on their

tasks, which made them ignore intrusions stemming from their working conditions. Although the research seems to suggest that heavy work demands reduce employees' attention to poor working conditions, the validity of such a finding needs to be tested over a longer period of time. Moreover, practitioners should always be wary of the negative effects on employees' physical and mental health caused by the interaction of two sets of undesirable factors.

### 1.3.5. Job Characteristics as Joint Determinants of Job Stress

Whyte (1948) is perhaps the first researcher who examined the interactive effects of work demands and control over work environment on employees' stress. He found that restaurant workers experienced the severest strain when they were faced with heavy customer demands which they were unable to control. Gouldner (1954) found that close supervision and heavy work load jointly increased personal tensions for miners. Crozier (1964) and Drabek and Hass (1969) examined the interactive effects of heavy work load, rigid rule structure, and limited PDM on job stress.

Karasek (1979) developed a four-cell job strain model to examine the joint effects of two job characteristics: job demands and job decision latitudes. The combination of low job demands and low job decision latitude is defined as a 'passive job'; high job demand and low decision latitude as a 'high strain job'; low job demand and high decision latitude as a 'low strain job'; and high demand and high decision latitude as an 'active job'. Karasek reported that individuals in occupations with high demand and low decision latitude were likely to suffer the severest psychosomatic complaints. In a recent book, Karasek and Theorell (1990) concluded that job stress is a function of decision latitude and control over the work environment.

The same line of research has been carried out by others. Warr (1987) found that attentional demand and responsibility were determinants of psychological and physiological well-being. Cobb and Rose (1973) found that air-traffic controllers suffered from usually high levels of

stress-related diseases such as peptic ulcers, particularly when working in high-density traffic areas. The joint effects, of high attention required and high responsibility relating to human life and aircraft, are causes of high stress. Martin and Wall (1989) outlined the joint effects of attentional demand and cost responsibility on stress for shopfloor jobs.

**Evaluation**

Five approaches to examining the relationships between job design and job stress have been reviewed. The first approach is the simple correlational study of job characteristics and role stressors. It occupies a small portion of the vast amount of research relating role stressors to other variables. Jackson and Schuler's meta-analysis (1985) of role ambiguity and conflict reported about ten studies which specifically investigated the relationship between job characteristics and role stressors. The correlations between job characteristics and role stressors are generally low. The second approach regards job design as an antecedent of role ambiguity and role conflict. This type of study provides the basis for the job design/stress literature. In general, studies using this approach are simply designed, each including only a few variables. The third approach incorporates job design and role stressors as two sets of independent variables to predict stress-related outcomes. Since numerous independent variables are included in this type of study, some theoretical models have emerged and have been tested. "Causal forces" of job design and role stressors to stress are compared. The role stressors were often found to have a stronger linkage with stress than the job design variables. However, the relationship between these two sets of independent variables has seldom been examined. The fourth approach examines the joint effects of job design and role stressors on stress. Job design has often been hypothesized to be a moderator in the relationship between role stressors and stress. The fifth approach examines the joint effects of job characteristics on stress. Not many job

characteristics have been included in this approach, however, exciting and illuminating results have been reported. In particular, the joint effects of job demands (or responsibility) and lack of control over the environment on stress have received empirical support (i.e., Karasek, 1979; Martin & Wall, 1989).

**Contribution of Previous Research**

To summarize, the most significant contribution of the correlational studies is that they have revealed the complexity of the relationships between job design and job stress. Two important findings have been brought to light. First, the correlations between job characteristics and role stressors are generally low, which has challenged the appropriateness of the sole use of role stressors to predict job stress. Second, although most research relating job design to job stress has implicitly postulated that enriched job characteristics should be associated with decreased role stressors, research evidence suggests both positive and negative linkages between job characteristics and role stressors. It seems that the relationship between task characteristics and role stressors is much more complicated than was commonly believed.

Causal studies are rare in this field. They have tested four hypotheses: job design is the antecedent of job stress; job design and role stressors are independent antecedents of job stress; job design and role stressors jointly affect job stress; and job characteristics jointly affect stress. It is difficult to make a conclusive interpretation of the results due to the small number of studies that have been conducted. However, valuable information has been accumulated. First, past studies have clarified causality of a few job characteristics such as PDM to stress. Second, as sets of variables, the predictive power of role stressors to stress is generally greater than that of job characteristics. Third, the joint effects of job design variables and role stressors on stress and the joint effects of different job characteristics on stress have received some empirical support.

## Limitation of Previous Research

The job design/stress literature is not yet theory driven. Although researchers have strived for model developments, the theoretical bases of these models are relatively weak. It is commonly assumed that enriched job characteristics should decrease stress. Empirical support for this linkage is neither strong nor consistent. Very limited effort has been made to investigate whether a negative or a curvilinear relationship may exist between certain job characteristics and stress.

The job design/stress literature is heavily influenced by role stress constructs. Role ambiguity and conflict have remained the dominating measures in this field. Potential danger may arise due to the over-reliance on role stress constructs. From the theoretical perspective, there is no established theoretical linkage between role stressors and job stressors. Studies in the past only reported associations between role stressors and job characteristics. No evidence is available to assure the representativeness of role stressors to job stressor as a whole. From the methodological standpoint, the use of role stress measurement lacks consensus. For instance, role ambiguity and conflict have been treated as <u>stressors</u> in the studies using the third and fourth approaches but as <u>stress</u> in the studies using the second approach. The relationship between job design and other forms of stress has not been systematically investigated.

The causal studies of job design and job stress have been rare. Only a few job characteristics, such as participation in decision-making, have been investigated as causal factors of stress (e.g., French et al., 1960; Jackson, 1983). The causal effects of skill variety, task identity, and task significance on stress have almost not been tested. The examination of mediating effects of role stressors in job design/stress relationship is completely missing. Lack of broader explorations and in-depth examinations of the relevant variables and relationships has limited the theoretical development in this field.

## Chapter Two

## Theoretical Framework of the Present Study

Chapter One critically reviewed the theoretical and empirical research on job design, job stress, and the relationship between job design and stress. As an area of research, job design has been the most active forum for work on job attitude (O'Reilly, 1991), and numerous theories have been developed and tested. Job stress is at a less developed stage. There is still a great deal not known about the antecedents and consequences of job stress. Encouragingly, job stress is gaining importance in both academic research and management practice.

The research area which has been least explored is the relationship between job design and stress. No established theories are available to guide research in this field. With regard to the limited empirical studies relating job design to stress, research evidence has been available for: (a) correlations between some job characteristics and role ambiguity and conflict; (b) causality between very few job characteristics and role ambiguity and conflict; (c) role ambiguity and conflict may have stronger predictive powers to stress-related outcomes than the job characteristics; and (d) job design factors and role stressors may jointly affect stress.

Numerous unsolved problems have remained:

1. Job design has been narrowly defined in the studies of job design and stress. Job content variables, particularly the core job characteristics (JDS, Hackman & Oldham, 1976), have been used as representative measures of job design. Very limited studies have examined the relationship between job context and stress. The interactive effects of job content and job context on stress have been rarely investigated.
2. An over-reliance on the role stress construct has restricted the scope and depth of cultivation in this field. Limited knowledge has

been accumulated regarding the relationship between job design and other forms of stress.

3. The relationship between job design and stress has been simplified. It has been commonly believed that job complexity would decrease job stress. Little effort has been made to explore the possibility of a curvilinear relationship between certain job characteristics and stress.

4. Few researchers have attempted to incorporate job design, role stressors, and stress into the same study. Whenever such an attempt was made, either job design or role ambiguity/conflict was examined as a moderator. Almost no study has ever investigated the possible linkage of job design-role stressor-stress.

The present study aimed to address these deficiencies by providing a new model of job design and job stress. This model highlights the linear and curvilinear relationships between job characteristics and job stress, the interactive effects of job design and personal characteristics on stress, the interactive effects of job content and job context on stress, and the mediating effects of role ambiguity and role conflict in the relationship of job design and stress.

This chapter consists of three sections. Section 2.1. introduces the major variables included in this study. Section 2.2. presents the proposed model of job design and job stress and four research issues derived from the model. Section 2.3. expands the theoretical discussion of the four research issues. Eight research hypotheses are developed based on the discussion.

## 2.1. Variables

The primary focus of this study was the outcome variable: job stress. Job stress is defined as an individual's reactions to the characteristics of the work environment which appear threatening to that individual (French, 1963).

Job design was examined as a predictor of job stress. Job design refers to the overall set of job-related activities performed by the job holder. In this study, it was measured by job content and job context. Job content refers to the core job characteristics, and was measured by skill variety, task identity, task significance, autonomy, feedback, responsibility, and participation in decision-making (PDM). It was also measured by the summary measures of job complexity. Job context is the immediate environment surrounding the job, and was measured by undesirable working conditions and perceived fairness. The rationale of choosing these dimensions to measure job content and context will be discussed in Section 2.3.3.

Two role stressors, role ambiguity and role conflict, were examined as mediating variables. Role ambiguity is the degree to which clear information is lacking regarding role expectations and methods for fulfilling role expectations. Role conflict is defined as an incongruity of the expectations associated with a role. This study proposed that these two role stressors are functions of job characteristics and predictors of stress.

Personal characteristics, including need and ability, were proposed as moderators which influence the strength and/or direction of the relationship between job design and stress. Need was measured by growth need strength and a self-assessment of the match between what the job holder wants to receive from his or her job and what the job can supply to satisfy these needs (S-V match). Ability was measured by education, tenure, and a self-assessment of the match between job demands and the individual's ability (D-A match).

## 2.2. Theoretical Model of Job Design and Job Stress

The proposed model of job design and job stress is presented in Figure 1. It provides a framework for the empirical tests of the relationship between job design and stress. On the basis of the previous

conceptualizations of job design and job stress, this study hypothesized that, in general, the relationship between job complexity and stress is negative.

> **Hypothesis 1.** Job complexity, in the integrated form of skill variety, task identity, task significance, autonomy, feedback, responsibility, and PDM, is negatively related to stress.

Differing from most previous studies, this study proposed that the relationships between job design and job stress are complex. In this study, the complexity has been examined from four aspects:

1. The job design-stress relationship can be linear as well as curvilinear, depending on the nature of job characteristics. Autonomy may have a linear, negative relationship with stress because autonomy gives the job holder incremental control over the work environment. Task significance and responsibility may have a U-shaped curvilinear relationship with stress. This study has explored the possibility of a curvilinear relationship between these job characteristics and stress.
2. The job design-stress relationship varies among people with diverse needs and abilities. Needs and ability moderate the relationship between job design and stress. This study has tested both versions of P-E fit theory: S-V fit and D-A fit.
3. The job design-stress relationship is not uni-dimensional. Stress does not result from a single aspect of the work environment. Two important aspects of job design, job content and context, were included in this study. The interactive effects of job content and job context on stress have been examined.
4. The job design-stress relationship may not always be direct. This study hypothesized that role ambiguity mediates the relationships between skill variety, task identity, feedback, PDM, and stress. Role conflict mediates the relationships between task identity, PDM, and stress.

On the whole, this study has mainly examined four inter-related issues:

1. **Curvilinear and linear relationships between job characteristics and stress.**
2. **P-E fit/misfit and stress.**
3. **Interactive effects of job content and job context on stress.**
4. **Mediating effects of role stressors.**

These research issues, especially issues 1, 2, and 4, have seldom been examined and very limited relevant research has been established. Hence, the research hypotheses of this study were highly tentative. They have provided the framework for exploring the complex relationships between job design and stress.

## 2.3. Theoretical Foundations of the Four Research Issues

### 2.3.1. Curvilinear and Linear Relationships Between Job Characteristics and Stress

A careful examination of job design and job stress literature revealed three inter-related phenomena:

1. In job design literature, a leading school of thought, as presented by the job characteristics model (Hackman & Oldham, 1876), has viewed job complexity as functional for the organization and its members.
2. In job stress literature, a leading school of thought, as presented by Kahn et al. (1964) and French et al.(1974), has viewed job stress as dysfunctional for the organization and its members.
3. In the small body of literature relating job design to stress, the general tendency has been to hypothesize and test a linear, negative linkage between job complexity and stress (see Jackson & Schuler's meta-analysis, 1985).

This study probed the possibility of a U-shaped curvilinear relationship between certain job characteristics and stress. It proposed that job complexity may be functional as well as dysfunctional for the organization and its members. In other words, a very high level and a very low level of job complexity can be both detrimental for the job holder.

The proposed U-shaped curvilinear relationship between job complexity and stress is rooted in the theory of activation (Levi, 1972). The activation theory suggests an inverted U-shaped relationship between stress and performance. That is, each employee may have an optimum stress point. On the left side of the inverted-U, the employee would likely experience role/work underload (lack of enough activation). On the right side of the inverted-U, the employee would likely experience role/work overload (too much activation). Therefore, below or above the optimum stress point the employee would not perform as well as he or she does at the optimum point (Levi, 1972; Malmo, 1959).

The activation theory has guided a number of studies which examined the relationship between stress and performance (e.g., Cohen, 1980; Cooper & Marshall, 1975; McGrath, 1976). Further, it was the theoretical basis for the studies which examined the curvilinear relationship of job complexity and affective responses (e.g., Champoux, 1992).

This study adopted the activation theory to examine the relationship between job design and stress. It proposed a U-shaped curvilinear relationship between job complexity and stress. In activation theory terms, between the extreme levels of job complexity there is an optimum point. This point is unique for each individual and represents the lowest level of stress. Too low or too high levels of job complexity can both be stressful because the former gives too little stimulation while the latter gives too much stimulation for the job holder.

The curvilinear relationship between job design and stress has seldom been examined in the past. Nevertheless, French et al. (1982)

found that either too much or too little job complexity was related to job dissatisfaction, depression, and boredom.

This study probed the stressfulness of job complexity as well as job characteristics. It suggested that certain job characteristics may have a curvilinear relationship while others may have a linear relationship with stress, depending on the nature of job characteristics. The analysis of which job characteristic(s) would likely have a curvilinear association with stress was guided by Warr's research (1985).

Warr (1985) suggested that job characteristics may have different effects on the focal person's attitude and stress level. He drew an analogy between the desired features of a job and the vitamins necessary for health. Some job characteristics are like vitamins C and E (CE factors) -- a certain level is necessary for people's health, while above this level they do no harm. But, some other job characteristics are like vitamins A and D (AD factors). It is harmful if the job does not have these features. It is also harmful if these features go beyond a certain level. That is, CE factors have a constant effect on stress whereas AD factors have an additional decrement beyond the optimum.

This study hypothesized that task significance and responsibility were AD factors which would have a U-shaped curvilinear relationship with stress. The optimum point of the U's curve is determined by the focal person's maximum level of ability (or perceived ability) to deal with task significance and/or responsibility. On the left side of the optimum point, the relationship between these job characteristics and stress is negative, because these characteristics provide motivating features for the job holder and reduce stress. On the right side of the point, the relationship becomes positive. The positive relationship between responsibility and stress, after the optimum point of the U-shaped curve, might be due to lack of ability and experience to handle the incremental responsibility. With regard to task significance, it might be due to fear of poor performance, which may lead to severe consequences to others.

The rationale of proposing task significance and responsibility as AD factors was twofold. On one hand, these two job characteristics likely create demand which requires the job holder's time, ability, and experience, and all these factors are constricting in many ways for a job holder. Stress arises when one's time, ability, and experience are not sufficient for taking the responsibility and/or dealing with the task significance. As viewed in 1.3.5., previous research found that responsibility was a typical job characteristic which had joint effects with job demand on stress (e.g., Cobb & Rose, 1973; Martin & Wall, 1987; Warr, 1987). Further, research evidence is also available for the curvilinear relationship between responsibility and satisfaction (Turner & Lawrence, 1965). On the other hand, these two job characteristics cannot easily be denied or transferred to others by the job holder. For instance, a surgeon cannot reduce the degrees of responsibility and task significance of his or her job. However, he or she can partially control the extent to which he or she participates in decision-making, uses autonomy, and obtains feedback from patients and peers. Therefore, in comparison with the other job characteristics included in this study, task significance and responsibility have a propensity to create job demand for the job holder without giving the job holder incremental control over the work environment. The hypothesis of the curvilinear relationship between these two job characteristics and stress is as follows:

> **Hypothesis 2.** There is a U-shaped curvilinear relationship between task significance and stress and between responsibility and stress. Employees whose jobs are high in task significance and/or responsibility and those whose jobs are low in these features will experience higher stress than employees whose jobs have intermediate levels of task significance and/or responsibility.

Autonomy was proposed as a CD factor in this study. It was hypothesized as having a linear, negative relationship with stress. Autonomy is a unique characteristic of job design. The desire for freedom and autonomy is in the nature of human beings. It represents the

fundamental attitudes of human beings towards the environment. As was pointed out by Argyris (1957), historically, management has involved a confronting process in which a balance has been made between the organization's pursuit of rules and discipline and the employees' pursuit of autonomy. Modern organizations may have standardized individuals' working behaviours to a certain extent, however, they cannot, and should not, minimize individuals' desires for autonomy. Moreover, unlike responsibility and task significance whose effects on stress are restricted by employee abilities, experiences, and fear of failure, a great deal of autonomy would unlikely do harm to the job holder. Further, it would enhance one's control over his or her work environment. Therefore, it is unlikely that autonomy would have a U-shaped relationship with stress.

**Hypothesis 3.** Autonomy has a linear, negative relationship to stress.

### 2.3.2. P-E Fit/Misfit and Job Stress

The P-E fit approach to job stress has served as the theoretical foundation for the overall study. "The P-E fit approach characterizes stress as a lack of correspondence between characteristics of the person (e.g. abilities, values) and the environment (e.g. demand, supplies). This lack of correspondence is hypothesized to generate deleterious psychological, physiological, and behavioral outcomes, which eventually result in increased morbidity and mortality." (Edwards & Cooper, 1990, p293)

As indicated in Chapter One, the notion of P-E fit includes two versions. One involves the fit between environmental supplies and personal values, goals, and motives (S-V fit). The other involves the fit between environmental demand and personal abilities and skills (D-A fit). The job stress literature has suggested that the major differences between S-V fit and D-A fit are their underlying processes and their associated outcomes. Differences in process are reflected in the components that constitute S-V fit and D-A fit. Differences in outcomes are that D-A fit

is likely to influence performance whereas S-V fit is unlikely to do so (Edwards & Cooper, 1990). Venkatraman (1989) conceptualized the notion of fit in strategy research into six distinct perspectives: (a) moderation, (b) mediation, (c) matching, (d) gestalts, (e) profile deviation, and (f) covariation. Using his conceptualization in this study, the tests of S-V fit and D-A fit belong to the category of "fit as moderation". "According to the moderation perspective, the impact that a predictor variable has on a criterion variable is dependent on the level of a third variable, termed here as the moderator. The fit between the predictor and the moderator is the primary determinant of the criterion variable." (Venkatraman, 1989, p424) This study proposed that personal needs and ability have contingent effects on the job complexity-stress relationship. They affect the direction and strength of the relationship between job design and job stress. The theoretical foundations of S-V fit/stress and D-A fit/stress are discussed separately below.

### S-V Fit and Stress

Schuler's conceptualization of S-V fit (1980 a) involves a dynamic condition that potentially prevents the job holder from being, having, or doing what he or she desires. It is rooted in Locke's (1976) theory of job satisfaction. Locke defined job satisfaction as a function of the discrepancy between the job outcomes a person wants and the outcomes that are perceived to be obtained. The notion of S-V fit suggests that a disparity between an individual's preferred and actual states of working life would result in stress.

The concept of S-V fit is also incorporated into the job characteristics model (JCM, Hackman & Oldham, 1976). The JCM suggests that enriched jobs will lead to a higher level of satisfaction and motivation for those individuals with a strong need for personal growth than for those who are low in growth need.

At least three meta-analyses examined the interactive effects of job

complexity and growth need strength on affective outcome and performance. Loher, Noe, Moeller and Fitzgerald (1985) found that growth need strength moderated the relationship between job characteristics and satisfaction. Fried and Ferris (1987) reported a moderating effect between job complexity and performance. Spector (1985) found evidence of moderator effects of growth need strength on the relationship between job scope and satisfaction, motivation, and performance. In all these meta-analyses, the individuals with high growth needs responded more favourably to job complexity than those with low growth needs.

A slightly different perspective was proposed by Champoux (1992, p88): "Those with strong growth needs could perceive complex jobs as an opportunity; those with weak growth needs could perceive them as a constraint or excessively demanding."

The difference between the results of the three meta-analyses and Champoux's statement is that the former suggested that the high growth need group responded more favourably to job complexity than the low growth need group (more favourable vs. less favourable), whereas, the latter suggested substantively different attitudes, between high and low growth need groups, towards job complexity (opportunity vs. demand).

Two alternative hypotheses can be derived from Champoux's statement. One, since job complexity is viewed as an opportunity by the high growth need group, it can be hypothesized that the negative relationship between job complexity and stress should be stronger for those with higher growth needs than for those with lower growth needs. Two, since job complexity is viewed as a threat by the low growth need group, it can also be hypothesized that the positive relationship between job complexity and stress should be stronger for the low growth need group than for the high growth need group. It seems that Champoux tended to agree with the second alternative because he suggested that (1992, p88) "the point at which jobs would be stressful would happen sooner for those with weak growth needs than for those with strong growth needs."

This study proposed that growth need strength (P) enhances the negative relationship between job complexity (E) and stress. Lack of job complexity is generally associated with stress. However, its strength as a stressor depends on the job holder's growth need strength. For individuals who are characterized by high-level growth needs, a job design without sufficient complexity will fail to supply motivating features to fulfil their needs (S-V misfit), which would lead to stress. Therefore, the negative relationship between job complexity and stress should be stronger for those with higher growth needs than for those with lower growth needs.

All seven job characteristics included in the present study, skill variety, task identity, task significance, autonomy, feedback, responsibility, and participation in decision-making (PDM), constitute motivating features for a job holder. These motivating features provide environmental "supplies" for meeting the job holder's needs. Hence, all of these characteristics are components of S-V fit. The hypothesis is as follows:

> **Hypothesis 4.**
> Growth need strength moderates the relationship between skill variety, task identity, task significance, autonomy, feedback, responsibility, PDM, and stress. The negative relationship between these job characteristics and stress will be stronger for individuals with higher growth need strength than for those with lower growth need strength.

**D-A Fit and Stress**

The underlying conceptualization of D-A fit is fundamentally different from that of S-V fit. D-A fit indicates that job stress involves a perceived environmental demand which threatens to exceed the person's capacities and resources. McGrath theorized that a misfit between environmental requirement and the individual's actual capacity to reach the requirement will result in stress. "Past experience in the form of similarity with the situation, past exposure to the stressor condition, and/or practice or training in responses dealing with the situation, can

operate to affect the level of subjectively experienced stress from a given situation, or to modify reactions to that stress." (McGrath, 1976, p1353) In this conceptualization, ability can reduce one's perception of uncertainty of work environment, thus reducing stress. Similarly, Karasek's (1979) job demand model suggests that stress occurs when high demands are combined with low ability to influence work environment (i.e., low decision latitude).

A number of researchers (Abdel-Halim, 1981; French & Caplan, 1972; Kahn et al., 1964; McGrath, 1976; Schuler, 1980 a) tended to agree that high-ability individuals are better able to deal with stress. Schuler (1977, a) suggested an "ability-adaptability phenomenon" to explain the manner in which the role stressors and employee ability interactively affect stress. According to Schuler (1977, a, p105), "within a given level in any organization, role perceptions would be related to satisfaction and performance within a range depending upon the level of employee ability. The higher the employee ability, the lower the relationship between role perceptions and satisfaction and performance."

The rationale of this prediction was threefold: first, ability reduces the individual's perception of uncertainty, thus reducing stress. Second, high-ability individuals can choose a better strategy to deal with stress than those with low ability. Third, high-ability individuals may find dealing with stressors intrinsically rewarding and satisfying. In this case, stressors may represent opportunities rather than constraints (Schuler, 1980 a).

This study proposed that ability (P) moderates the relationship between job design (E) and stress. When the individual perceives that he or she lacks ability/skills for completing his or her job (D-A misfit), job complexity will result in stress.

In general, job design influences the number and level of skills required. However, not <u>all</u> job characteristics would create a requirement for ability and skills. This study proposed skill variety, task identity,

feedback, responsibility, and PDM as components of D-A fit. That is, these characteristics may require the job holder's skills and ability to control work process, capacity to take responsibility and to participate in decision-making, and flexibility to deal with feedback.

Task significance and autonomy were not proposed as components of D-A fit since they do not seem to constitute a demand for skills and ability. It should be noted that relevant theories are not available for this topic. Therefore, the above propositions are partially based on the conceptualization of different job characteristics and partially based on face validity judgment.

> **Hypothesis 5.** Ability moderates the relationship between skill variety, task identity, feedback, responsibility, PDM, and stress. The negative relationship between these job characteristics and stress will be stronger for individuals with higher abilities than for those with lower abilities.

### 2.3.3. Interactive Effects of Job Content and Job Context on Stress

This study incorporated two important aspects of job design: job content and job context. Job content refers to the core characteristics of the job itself. Job context is the immediate environment surrounding the job. Job content and context represent two distinctive aspects of job design, though they are related and overlapping to a certain extent. Within an occupation, job content is likely to be similar across different job settings, whereas, job context may vary extensively. For instance, a chef working at the Hilton Hotel and a chef working in a Chinatown restaurant may share similar job content. However, their physical working conditions, pay levels, and promotion opportunities can be very different. The chef working in a humid and crowded basement kitchen and receiving minimum wage will likely experience a higher level of stress than his counterpart working in a better context. Therefore, it is important to assess both content and context in order to examine the effects of job design on stress.

The multi-disciplinary approach to job design (Campion, 1988) has

inspired the potential of examining job design from a multi-dimensional perspective. This study adopted the multi-disciplinary approach to investigate the effects of job content and context on stress. Theoretically, the multi-dimensional approach to job stress can provide richer information than the uni-dimensional analysis. Methodologically, it may increase the level of objectivity since "context is a variable that can be measured objectively." (Gaines & Jermier, 1983, p572)

Theories of motivation have provided the groundwork for examining job design from both content and context perspectives. Early research conducted by Walker and Guest (1952) provided graphic descriptions of human response to the relentless pace of fractionated jobs on the assembly line. The motivation-hygiene theory (Herzberg et al., 1959; Herzberg, 1966) explains worker responses to job properties by incorporating content and context perspectives. Since then it has been increasingly accepted that job content is mainly associated with intrinsic motivation while context is mainly associated with extrinsic motivation. Turner and Lawrence's study (1965) clearly defined job content and context as motivating features of job design. Furthermore, they developed the instrument Requisite Task Attributes to assess motivating properties of jobs.

In the job characteristics model (Hackman & Oldham, 1976), intrinsic job characteristics (job content) are the predictors while extrinsic features are moderators of the job content-outcome relationship. The interactive effects of job content and context on satisfaction, motivation, and performance are clearly indicated in the model. Further, Hackman and Oldham (1980) suggested that the job incumbent must have a positive work context for job re-design to succeed.

Theories of motivation have implied that there is a linkage between a person's perception of job content and his or her perception of job context. There is also empirical evidence for this linkage (Brass, 1981; Oldham & Hackman, 1981; Rousseau, 1978). However, research on job design

has overlooked job context factors to a large extent (Roberts & Glick, 1981). Similarly, job stress literature has emphasized job content. Two dominant role stressors, role ambiguity and conflict, are mainly job content-oriented. Although some studies (e.g., Baba & Jamal, 1989; Poulton, 1978) examined relationships between certain job context variables (such as physical working conditions and shiftwork) and job stress, these investigations have focused on blue-collar workers. Moreover, the effects of job content and context on stress have been examined separately. This type of uni-dimensional analysis has provided useful information about correlations between certain elements of job design and stress. But, it has failed to explore the interactive effects of different elements on stress. The present study questioned the general tendency of examining the effects of job content and context separately. It proposed that job stress is not only content-determined but also context-related. It examined the main effects of job content and context on stress. Further, it emphasized the interactive effects of job content and job context on stress.

In this study, job content was measured by job complexity. Job context was measured by undesirable working conditions and perceived fairness. The selection of these two contextual variables was determined by three factors. First, these two contextual variables are conceptually exclusive to job content variables. They measure the immediate environment in which a job is embedded rather than the core features of the job itself. Second, these two variables are applicable for numerous job designs. Third, the associations between these variables and stress have been examined separately in previous studies (e.g., Kahn et al., 1964; Poulton, 1978; Russell et al., 1987). To include them in the same study would provide information for comparing the stressfulness of different contextual factors. The hypothesis is presented as follows:

> **Hypothesis 6.** The combination of low job complexity and unsatisfactory job context creates the highest level of stress in comparison with other combinations of job content and context.

Hypothesis 6 proposed a compensative relationship between job content and context. It is rooted in Alderfer's ERG theory (1972). The ERG theory suggests that as more "concrete" needs are satisfied, energy can be directed towards satisfying less concrete needs. However, if the higher-level needs are not gratified, individuals will increase their desires for the gratification of lower-level needs. Using the ERG theory in the study of job design and stress, the frustration of less concrete needs (it is often related to job content) may lead the job holder to regress to a more concrete need category (job context). That is, when job content cannot satisfy the individual's higher-level needs, the individual may increase his or her desire for the job context for "compensation". If a job design provides neither intrinsic quality nor satisfactory context, it minimizes the motivating potential and maximizes the stress potential for the job holder. Therefore, the combination of low job complexity and unsatisfactory context should create a higher level of stress than other combinations of job content and context.

The rationale of Hypothesis 6 was also based on the preceding conceptualization of D-A fit and stress. People may differ greatly in responses to stress, however, one thing should be common: combined stressors generally create a higher level of stress than a single stressor. Combined stressors may even create larger effects than the sum of the effects of individual stressors. Poulton (1978) theorized why combined stressors can have more impact than the sum of the effects of individual stressors. He pointed out that if a worker is subjected to a single stressor, his or her efficiency may decrease by 10% because he or she is able to compensate for much of the adverse effects of the stressor. However, if the worker has to deal with three stressors simultaneously, his or her efficiency will decrease by more than 30% because he or she has only limited abilities to compensate for incremental stress. Therefore, the combined stressors, low job complexity and unsatisfactory job context, should be more stressful than if only one of these stressors is present.

Hypothesis 6 proposed low job complexity and poor job context as two general stressors. It should be emphasized that the effects of these two stressors may be different. Returning to the discussion in 2.3.1., between the extreme levels of job complexity there should be an optimum point of job complexity which is unique for each individual and represents the lowest level of stress. In other words, employees' preferences to job complexity may vary greatly, because preferred job complexity is not only determined by one's value/needs (S-V fit/misfit) but also restricted by his or her ability, experience, and time (D-A fit/misfit). Whereas, employees' preferences to satisfactory context should be a comparatively general phenomenon. On one hand, pursuit for comfort is within the nature of human-beings. On the other hand, work context does not necessarily require ability and experience. Therefore, variation in attitudes toward job complexity might be greater than that toward job context. Hence, job context might be a more "general" stressor than job complexity.

### 2.3.4. The Mediating Effects of Role Ambiguity and Role Conflict

Most conceptual and empirical work on job stress has been confined to role ambiguity and conflict. Even if job design variables were examined as stressors, role stressors have often been employed as criterion variables to assess the effects of job design. The present study seeks to partially redress this imbalance by examining stress vis-a-vis both job design and role stressors. It is argued that job design variables should be used as predictors of job stress while role stressors mediate the relationships between some job characteristics and stress.

As noted, job design as a predictor of job stress has its theoretical foundation. Further, if appropriately conducted, job stress research, based on job design variables, may have higher levels of generalizability and objectivity than research based on role ambiguity and conflict. It is because 1) job characteristics represent the basic units (components) of a job that can be used to describe all jobs; 2) many

measures of job design such as the JDS were originally developed for heterogeneous jobs; 3) self-reported job characteristics are relatively clean in comparison with other self-reported data in organizational behaviour research (Wagner and Crampton, 1990); and 4) alternative sources of measures such as DOT are available to test the validity of self-reported job characteristics. Whereas, role ambiguity and conflict are typical stressors for managerial and white-collar workers (Cooper & Marshall, 1978), but not for blue-collar workers (Shostak, 1980). Even within managerial occupations, role ambiguity and role conflict may vary according to managerial levels (Schuler, 1977 b).

MacBride (1984, p3) called for a shift of research attention "toward an emphasis on the stressfulness of various job components which may be found, to a greater or lesser extent, in any occupation." This study was a response to this call for a shift. It examined the stressfulness of job components on stress. Meanwhile, it examined the extent to which role ambiguity and role conflict may mediate the relationships between job characteristics and stress. The proposed mediation was based on the following motives:

First, role stress is a complex interaction of job design, leadership behaviour, interpersonal relationships, and organizational structure. The original design of the role stress theory suggested that job design is one of the predictors of role stressors. However, it did not indicate the specific linkages between job components and role stressors. Hence, French & Kahn (1962) and Kahn et al., (1964) suggested that the major concerns of role stress theory was to: 1) define role stress construct and to examine predictors of role stress; and 2) test the relationship between role stressors and psychological strain. There has been a large body of empirical evidence with regard to the second concern of French and his colleagues. As was pointed out by Newton and Keenan (1987), the predictors of role stressors have been neglected to a large extent. This study attempted to fill this gap by examining the

antecedents and consequences of role ambiguity and conflict. It proposed job design as a predictor of role ambiguity and conflict, which are in turn related to stress.

Second, previous studies have indirectly provided support for the hypothesized mediation effects of role ambiguity and conflict. The literature relating role stressors to job design and stress has revealed interesting phenomena:

1. Most stress studies found that role stressors lead to unfavourable outcome variables such as decreased job satisfaction, decreased motivation, poor performance, and increased levels of stress (Jackson & Schuler, 1985; Kahn et al., 1964).
2. Most job design studies found job complexity leads to favourable outcome variables such as increased job satisfaction, motivation, and sometimes even higher levels of performance and lower levels of stress (French et al., 1960; Hackman & Oldham, 1976; Karasek, 1979).
3. Some studies found a negative relationship between job complexity and role stressors (see Jackson & Schuler's meta-analysis, 1985).
4. Some other research, though limited in number, even found a positive relationship between some job complexity variables and role ambiguity and conflict (Abdel-Halim, 1981; Martin & Wall, 1989).

Given the fact that two associations, one between job characteristics and role stressors and another between role stressors and stress, have been identified in different studies, it is logical to investigate whether or not role ambiguity and conflict may mediate the relationship between job characteristics and stress.

Third, role ambiguity and conflict have been found to be stronger predictors to stress than job design when they were tested in the same studies (Baba & Harris, 1989; French & Caplan, 1972). It is meaningful to test whether job design is a weaker predictor by nature or if its impact on stress is actually mediated by role ambiguity and conflict.

The test of the mediation effects of role ambiguity and role conflict highlighted two features: (1) the mediating effects of role ambiguity and role conflict might not be the same, and (2) stress caused by job design might not be always role-related. In general, job context-stress relationships should not be mediated by role stressors. Further, it is questionable as to whether or not all the relationships between job characteristics and stress would be mediated by role stressors.

Role ambiguity and conflict may have different mediating effects, because they are two distinct constructs. Role ambiguity has been defined as the degree to which clear information is lacking regarding (a) the role expectation, (b) the method for fulfilling known role expectations, and/or (c) the consequences of role performance (Kahn et al., 1964). Three conditions are essential to reduce role ambiguity: 1) being able to anticipate with fair accuracy the consequences of one's own action, 2) being aware of the determinants of relevant events in the work place, and 3) being able to depend on the stability of surrounding conditions.

Pursuing this line of conceptualization, most job characteristics should be negatively associated with role ambiguity. It is because job complexity is likely to provide the job holder with information and predictability. As noted in Chapter One, skill variety increases the focal person's knowledge on different aspects of work process. Task identity leads to the person's awareness of how to fit into the organizational scheme. PDM helps the job holder to influence the work environment. Feedback is a source of information. All these factors contribute to clarification of role expectations, whereas, there may not be a single relationship between job context, task significance, responsibility, and role ambiguity. Therefore, role ambiguity was not proposed as having mediator effects on the relationships between these job characteristics and stress.

The hypothesis is as follows:

> **Hypothesis 7.** Role ambiguity mediates the relationship between skill variety, task identity, feedback, PDM, and stress. Lack of skill variety, task identity, feedback, and PDM leads to role ambiguity, which in turn leads to job stress.

Role conflict refers to contradictory role expectations. It can be reflected in various forms such as inter-sender, intra-sender, person-role, and inter-role, each representing unique confronting parties and underlying assumptions. It may also arise between work role and non-work role (Kahn et al., 1964). Clarification of role expectation is not a sufficient solution for role conflict. The relationships between role conflict and job characteristics are complex. Both positive and negative relationships may be involved. Task identity and PDM enlarge one's control over his or her working process. These variables may decrease role conflict. Responsibility may create incremental roles and interpersonal relationships which one has to handle, thus increasing role conflict. Meanwhile, responsibility may increase one's power to handle role conflict. It is difficult to identify a consistent relationship between responsibility and role conflict. Similarly, skill variety may lead to higher role conflict on some occasions, since increased requirements for skills may lead the focal person to play additional roles. However, if the focal person can master numerous skills, he or she may be able to utilize more approaches to cope with role conflict. Further, the content of feedback may decide whether it increases or decreases role conflict. Jackson and Schuler (1985) assumed that feedback should heighten role conflict for people who are in jobs where role conflict is already high, such as jobs requiring boundary spanning activities or interpersonal activities. When their meta-analysis reported a negative association between role conflict and feedback, they found it difficult to explain this finding, due to a lack of relevant theoretical guidance. As reviewed in Chapter One, empirical research relating job design to role stressors has produced much less consistent results for

role conflict than for role ambiguity. It was expected that the mediating effects of role conflict should be less consistent than that of role ambiguity. The hypothesis is presented as follows:

> **Hypothesis 8.** Role conflict mediates the relationship between task identity, PDM, and stress. Lack of task identity and PDM leads to role conflict, which in turn leads to job stress.

# Chapter Three

# Method

## 3.1. Subjects

This study was designed to examine the relationship between job complexity, job context, and stress. The nature of the study has determined that the sample must have two features: (1) the subjects should represent a wide variety of job designs; and (2) the subjects should come from a wide variety of job contexts. Therefore, a decision was made to choose the subjects from different organizations and different jobs.

The data was collected in mid-1991 mainly through a mail survey. The researcher telephoned the managers in numerous organizations in Montreal to schedule meetings with them in their organizations. At these meetings, the researcher introduced the purpose of the research and forwarded a copy of the questionnaire to the managers. Sixty-five organizations gave permission for the survey. They included banks, insurance companies, high schools, universities, construction companies, communication utility companies, hospitals, retail stores, restaurants, and manufacturing companies. Nine hundred and fifty questionnaires (950) were distributed by the managers in these organizations. Stamped envelopes were attached with the questionnaires which were returned directly, by the participants, to the researcher's university address.

At the beginning of September 1991, approximately fifty (50) questionnaires were distributed in two classes at Concordia University. The researcher supervised the distribution of these questionnaires and collected them directly upon completion. They were answered by full-time employees (part-time students).

Altogether, one thousand (1,000) questionnaires were distributed and four hundred and sixty (460) were returned. Among them 42 were unusable because they were completed by part-time employees. Therefore, subjects of

this study were 418 full-time employees representing 143 job titles.

The wide variety of job titles contained in the sample are presented in Appendix 1. The job classification of the 1970 United States Census was employed to categorize the 143 job titles into five groups: professional workers (n=90); managers (n=125); sales workers (n=37); clerical workers (n=101); and blue-collar workers (n=65).

Forty-nine percent (49%) of the participants were male while fifty-one percent (51%) were female. Six and a half (6.5) percent were under the age of 20; 39% were between 20 to 29; 28.5% were between 30 to 39; 19.7% were between 40 to 49; 5.3% were between 50 to 59; and 1% were above 60. The average participant had been in his or her current job for 4.5 years and had been in the same line of job for 8 years. The average number of years of education was 15.

## 3.2. Measures

### Predictor Variables

#### Job Content

Job content refers to the core job characteristics of a job. The job content of each participant was rated on three sources of measures: 1) incumbent report; 2) Dictionary of Occupational Titles (Roos & Treiman, 1980); and 3) Occupational Prestige Score (Treiman, 1977). The former included incumbent-reported job characteristics and job complexity. The latter two were summary measures of job complexity.

##### Incumbent Report of Job Characteristics

Appendix 2 is a sample of the questionnaire used in this study. Incumbent-reported job characteristics included the five JDS job dimensions (Hackman & Oldham, 1975). They were skill variety (Appendix 2, Items 6, 31, and 34), task identity (Appendix 2, Items 5, 32 and 37), task significance (Appendix 2, Items 7, 35, and 40), autonomy (Appendix 2, Items 4, 36, 39), and feedback (Appendix , Items 3, 33, 38). The JDS has been the most commonly used measure of job design and its psychometric

properties have been established (Fried & Ferris, 1987).

Among the studies which examined the comprehensiveness of the JDS as a measure of job design (Idaszak, Bottom, & Drasgow, 1988; Jans & McMahon, 1989; Kiggundu, 1983; Taber & Taylor, 1990). Jans and McMahon (1989) considered that the JDS should have a person-task match variable. Kiggundu (1983) suggested adding a variable of job interdependence to the JDS. Since this study especially examined the match between person and job, the JDS's possible shortcoming of a lack of person-task match variable can be effectively compensated for. The measures of responsibility (Caplan et al., 1975) and participation in decision-making (PDM, Vroom, 1960) were included in this study to supplement the assessment of a job's interdependence with other people and/or other jobs. The variable responsibility had six items (Appendix 2, Items 12 to 17). PDM had four items (Appendix 2, Items 8 to 11). The alpha reliability coefficients of the seven job characteristics ranged .64 to .82 and averaged .73.

A summary measure of job content was developed by averaging the responses to all seven job characteristics. This measure was named job complexity. As a result of the concerns raised by Evans (1991) and Evans and Ondrack (1991), the multiplicative form of the summary measure was not utilized. The alpha reliability of the summary measure was .89.

Nonincumbent Measures of Job Characteristics

Historically, the studies of job design and job stress have relied largely on incumbent reports of job characteristics. Although some subjective measures, such as JDS, have verified congruence with objective measures of job design (Fried & Ferris, 1987; Gerhart, 1988), the sole use of self-reported data has often been criticized due to unavoidable subjectivity and difficulties of identifying causal directions (Roberts & Glick, 1981; Salancik & Pfeffer, 1978). Recently, multiple data sources have been used in more than ten published studies. However, as pointed out by Spector and Jex (1991, p47), "One feature of most studies in which

multiple data sources have been used is that nonincumbent sources were not independent of the incumbent sources. Most were peers or supervisors, who may have shared biases with the incumbents..... What is needed is research in which alternative sources are truly independent of the job incumbent." This study employed two alternative measures which are truly independent of the job incumbent. They were the Dictionary of Occupational Titles (DOT, Roos & Treiman, 1980), and Occupational Prestige (OP, Treiman, 1977).

DOT (Roos & Treiman, 1980) was designed based on on-site observations of various jobs as they were actually performed rather than based on self-report of job holders. It has been used effectively in several studies of job design (Gerhart, 1987, 1988; Shaw & Riskind, 1983; Spector & Jex, 1991). The DOT measure of substantial complexity includes eight dimensions: 1) complexity of the function in relation to data, 2) complexity of the function in relation to people, 3) specific vocational preparation, 4) intelligence, 5) verbal aptitude, 6) numerical aptitude, 7) abstract and creative versus routine, concrete activities, and 8) repetitive or continuous processes. Roos and Treiman (1980) concentrated these dimensions into an index called the DOT measure of substantial complexity. It had a possible range of 0 to 10. It was conceptually similar to the incumbent-reported job complexity.

Each participant in this study provided his or her job title as well as specific descriptions of major job activities. The researcher and a research assistant (an MBA student of Concordia University) coded DOT data for each participant independently according to this information. Neither of the two raters had access to the incumbents' self-report job characteristics prior to, and/or during, the coding process. The correlation between the two raters' codings of DOT job complexity was .96. This suggested a satisfactory level of inter-rater reliability.

The Standard Scale Score of Occupational Prestige (OP, Treiman, 1977) was also coded for each job contained in this study. The job

categories of DOT and OP were both derived from the 1970 United States Census. There are two differences between DOT and OP: 1) DOT measures job characteristics according to the criteria of job complexity, motor skills, physical demands, and undesirable working conditions, while OP is a function of education and income; and 2) OP combines similar DOT titles in its coding of Occupational Prestige. For instance, managers in wholesale trade and managers in grocery store trade are coded under distinct titles in DOT. Their DOT scores of job complexity, motor skills, and physical demands are slightly different, whereas these two jobs are given the same prestige score by OP. The 143 DOT titles contained in this study represented 51 Occupational Prestige Scores.

The purpose of incorporating these two nonincumbent measures in this study was threefold: 1) it helped to detect the effects of measurement artifacts such as common method variance; 2) it examined the degree of "match" between incumbents' perceptions of their jobs and expert observations of these jobs; and 3) it measured job characteristics from different perspectives. Although the incumbent and nonincumbent measures used in this study are conceptually convergent for the construct of job complexity, each has its own distinctiveness. The JDS mainly emphasizes job related activities. DOT measures the knowledge, intelligence, and skills required by a job. OP is an indicator of societal views towards various jobs. The use of all three has enabled researchers to reach a better understanding of a complicated construct-job design.

Job Context

Job context refers to the immediate environment surrounding a particular job. This study mainly examined two contextual variables: undesirable working conditions and perceived fairness.

Undesirable Working Conditions

Undesirable working conditions were rated by two sources of measures: incumbent report and a DOT measure.

Incumbent Report of Undesirable Working Conditions

Physical working conditions have been investigated rarely in the past, and therefore no established measure was available. Nevertheless, previous studies have provided some information about conditions which may cause stress for blue-collar workers (Poulton, 1978; Shostak, 1980; Sutton & Rafaeli, 1987) and for white-collar workers (Piller & Castleman, 1990). A new measure was developed based on this information. It included 13 items pertaining to temperature, noise, light, space, repetitive pace, danger, pollution, fresh air in the office, physical demand, control over privacy, excessive computer work, etc. (Appendix 2, Items 18 to 30). Special attention has been paid to the inclusion of blue-collar stressors as well as white-collar stressors. Each participant was required to describe the frequency with which these conditions occurred in his or her work environment. This measure had a five-point scale. Responses ranged from "never" to "always". The alpha reliability of this new measure was .73.

Nonincumbent Measure of Undesirable Working Conditions

Three undesirable working conditions were measured by DOT. They were heat, cold, and wet. Roos and Treiman (1980) concentrated these conditions into an index called the DOT measure of undesirable working conditions. It had a possible range from 1 to 10. The inter-rater correlation of this measure was .77 in this study.

Perceived Fairness

Perceived fairness was measured to assess the extent to which rewards were perceived to be fair or unfair. Money, recognition, and physical facilities were examples of rewards. The measure of perceived fairness was developed by Price and Mueller (1986). It consisted of six items, asking the respondents to describe the extent to which they have been fairly rewarded considering the responsibilities they have; the amount of education and training they have; the amount of experience they have; the amount of effort they put forth; the work they have done well;

and the stresses and strains of their jobs. (Appendix 2, Items 41 to 46). Responses were on a five-point scale from "rewards are very fairly distributed" to "rewards are not distributed fairly at all". The reliability of this measure has been high (i.e., Frone & McFarline, 1989). In this study, its alpha reliability was .92.

**Mediating Variables**

Role Ambiguity and Role Conflict

The scales developed by Rizzo, House, and Lirtzman (1970) were employed to measure role ambiguity and conflict. The measure of role ambiguity had six items (Appendix 2, Items 67, 68, 70, 72, 75, and 79). The measure of role conflict had eight items (Appendix 2, Items 69, 71, 73, 74, 76, 77, 78, and 80). Approximately 85% of previous research on role stress has used these scales (Jackson & Schuler, 1985). The internal reliabilities of the original design of these scales were .82 for role conflict and .78 for role ambiguity. The construct validity of these two scales has been supported consistently in different samples (Kelloway & Barling, 1990). In this study, the alpha reliability coefficients were .73 for role ambiguity and .76 for role conflict.

**Moderators**

Growth Need Strength and S-V Match

Growth need strength (JDS "job choice" format, Hackman & Oldham, 1975) was measured as a personal characteristic for the test of S-V fit/misfit. This measure had 12 items (Appendix 2, Items 47 to 58). Its psychometric properties have been established (Aldag & Brief, 1979). In this study, its alpha reliability was .71.

A measurement of perceived fit between environmental supplies and individual values (S-V match) was developed. It consisted of three items: "I do not think that the job I am performing matches my needs and desires."; "My job provides me with sufficient opportunities to satisfying my needs for growth."; and "My needs for personal growth cannot be satisfied by the job I am performing". (Appendix 2, Items 64, 65, and 66).

Responses were on a seven-point scale from "strongly agree" to "strongly disagree". Its alpha reliability was .81. The correlation between GNS and S-V match was .15 ($p<.01$). It suggested that these two constructs were almost independent of each other.

Ability and D-A Match

Ability was assessed for the test of D-A fit/misfit. Years of education and years of work experience were measured. (Appendix 2, Items 2 and 3). These two variables were recommended by Schuler (1977 a) as appropriate indicators of ability.

A measure of perceived fit between job demand and individual abilities (D-A match) was adopted from Abdel-Halim (1981). It consisted of five items: "I feel I have adequate preparation for the job I now hold."; "I feel competent and fully able to handle my job."; "I feel that my job and I are well-matched "; "I feel my work utilizes my full abilities."; and "My job gives me a chance to do the things I feel I do best." (Appendix 2, Items 59 to 63). Responses were on a seven-point scale from "strongly agree" to "strongly disagree". The inter-correlations among these three measures were assessed. D-A match correlated -.02 and .33 ($p<.01$) with education and years of working experiences, respectively, and the latter two had a correlation of -.16 ($p\leq.01$). These variables seemed to measure different aspects of ability.

Outcome Variables

Time Stress and Anxiety

Parker and DeCotiis (1983) developed a measure to assess two distinct dimensions (variables) of stress: time stress and anxiety. Time stress measured the feeling of being under substantial time pressure and included eight items (Appendix 2, Items 83, 86, 88, 90, 91, 92, 95, and 96). The variable anxiety had four items (Appendix 2, Items 82, 85, 87, and 89). Responses were on a seven-point scale from "strongly agree" to "strongly disagree" for both variables. In the original design of these two variables, the alpha reliability coefficients were .86 for time stress

and .74 for anxiety, the correlation between these two dimensions was .54. Parker and DeCotiis (1983) suggested that these two dimensions were considerably non-overlapping. This measure has been frequently employed by other researchers. Its reliability has been reasonably high (e.g., Baba & Jamal, 1991; Jamal & Baba, 1991). In this study, the alpha reliability coefficients were .82 for time stress and .76 for anxiety.

Felt Stress

Another measurement of stress was called "subjective stress" (Motowidlo, Packard, & Manning, 1986). It assessed the frequency of the occurrence and intensity of felt job stress. It consisted of three items: "Very few stressful things happen to me at work."; "My job is extremely stressful."; and "I almost never feel stressed at work." (Appendix 2, Items 81, 84, and 93). Responses were on a seven-point scale from "strongly agree" to "strongly disagree". The reliability of this scale was .82 in its original study (Motowidlo, et al., 1986). This measure has not been used as frequently as that of Parker and DeCotiis (1983). The purpose of incorporating it into this study was to add a direct assessment of felt stress. Its alpha reliability was .74.

Emotional Exhaustion

The measure of emotional exhaustion (Maslach Burnout Inventory, Maslach & Jackson, 1986) was also included (Appendix 2, Items 97 to 105). It had nine items and responses were on a seven-point scale from "strongly agree" to "strongly disagree". Emotional exhaustion has been a typical measure of burnout rather than of stress. It has often been examined as a result of stress. This study included emotional exhaustion as a supplementary measure of stress for three reasons. First, emotional exhaustion is related to chronic stress. Job stress may be chronic. The conceptual linkage between job design and emotional exhaustion is apparent and the empirical evidence for the linkage is available (Maslach & Jackson, 1981). Second, emotional exhaustion refers to an extreme state of feelings. It implies more of an end of the road than any sort of

ongoing activity, whereas most other stress measures tend to assess ongoing activities. The inclusion of this measure may enlarge the coverage of the extent of stressfulness. Third, emotional exhaustion is a behavioral oriented measure. Since this study has not had any behavioral measures for the outcome variables, it is believed that inclusion of this measure would compensate this problem to a certain extent.

### 3.3. Descriptive Statistics

Table 1 presents the means, standard deviations, ranges, medians, and reliability coefficients of the major variables. The general level of reliabilities was acceptable. Alpha reliability coefficients of the job characteristics were as follows: variety, .76; identity, .67; significance, .64; autonomy, .74; feedback, .72; responsibility, .82; participation in decision making (PDM), .78; and complexity, .89. The average standard deviation of the five JDS measures was 1.4, which was slightly higher than JDS normative data based on a wide variety of jobs (Oldham, Hackman, & Stepina, 1979). Restriction of range was not a problem for most variables. An exception was the DOT measure of undesirable working conditions which had a low mean (0.13 out of a possible range 0-10) and low SD (0.6). In North America, few jobs have been characterized by the DOT job analysts as having undesirable working conditions. However, many job holders considered their jobs as having these features. The mean of self-reported undesirable working conditions was 2.33 (possible range 1-5).

#### 3.3.1. Dimensionality of Job Characteristics and Job Stress Variables

<u>Dimensionality of Job Characteristics</u>

This study included seven job characteristics. They were skill variety, task identity, task significance, autonomy, feedback, responsibility, and PDM. These characteristics were measured by twenty-

five items altogether. A factor analysis was conducted for two purposes: 1) to examine the empirical dimensionality of job characteristics; and 2) to investigate the extent to which common method variance may inflate this study. According to Podsakoff and Organ (1986), common method variance might be a problem if the pre-rotated factor analysis reports a single factor or a dominant factor that accounts for substantial variance. The twenty-five items of job characteristics were subjected to the factor analysis. The results are presented in Appendix 3.

Six factors emerged before rotations by maximum likelihood extraction. Four had eigenvalues above 1 and accounted for 43 percent of the variance. The other two factors accounted for an additional 6 percent of the variance and the eigenvalues of .84 and .64. Apparently, there was no dominant factor in the self-report job characteristics.

Varimax rotation was conducted to examine the dimensionality of the job characteristics. The factor loadings are shown in Appendix 3. The dimensionalities of three JDS dimensions, namely, identity, significance, and feedback, appeared to be exactly the same as suggested by Hackman and Oldham (1975). All six items measuring responsibility loaded in the same factor. The items measuring variety and autonomy loaded in one factor. The most "inconsistent" variable was participation in decision-making (PDM). Its four items loaded in three factors.

Overall, the results of the factor analysis were quite consistent to the proposed dimensionality. The reason why variety and autonomy loaded in one factor might be due to the similarity in wording. The reasons why the PDM items did not load in the same factor demanded further examination. Considering that these variables represent distinctive constructs (Hackman & Oldham, 1975, Vroom, 1960), and that they reached a modest level of reliability in this study (variety, .76; autonomy, .74; PDM, .78), they have been treated as three dimensions in subsequent analysis.

Dimensionality of Stress

Dimensionality of stress was examined using the same method. Twenty-four items measuring anxiety, time stress, felt stress, and exhaustion were submitted to a factor analysis. The results are shown in Appendix 4.

Four factors emerged before the rotations by maximum likelihood extraction. Two had eigenvalues above 1 and one had an eigenvalue of .99. These three factors accounted for 48 percent of variance. The last factor accounted for an additional 3 percent of variance and had an eigenvalue of .71. Therefore, there was no single or predominate general factor which accounted for substantial variance for the items measuring job stress. Common method variance has not been an apparent problem in self-reported job stress.

Varimax rotation resulted in four factors. The factor loadings are showed in Appendix 4. The items of time stress were loaded in one factor as suggested by its original design. The variable exhaustion had nine items, seven loaded in one factor while the rest loaded in another. For the variable anxiety, two items loaded in the factor of felt stress and the other two had cross-loadings in the factors of exhaustion and time stress. Due to similar reasons outlined above, these variables have been treated as their original designs in subsequent analysis.

### 3.3.2. Relationships Among Predictors, Mediators, and Outcome Variables

The factor analysis, discussed in 3.3.1., explored the possibility of common method variance within the predictors and within the outcome variables. This section detects the extent to which the method variance may influence the linkage of these variables.

Incumbent-reported data have been utilized in this study for measuring the predictors, mediators, moderators, and outcome variables. As suggested by Johns et al., (1992, p14 of the manuscript), "it must be emphasized that although common method variance inflates bivariate

relationships, it actually results in conservative tests of moderator effects. Spurious associations between the predictor and the criterion due to method leave less criterion variance for the joint effect to explain." It suggested that the test of common method variance should focus on the linkage of predictors (job characteristics)-mediators (role ambiguity and conflict)-outcome variables (stress).

A factor analysis was performed to test the distinctiveness of the proposed predictors, mediators, and outcomes. Seven job characteristics, two role stressors, and four stress variables were subjected to factor analysis. The results, shown in Appendix 5, have led to the following conclusions:

1. The distinction between the predictor and the outcome variables was extremely clear. All seven job characteristics loaded in one factor while all four stress variables loaded in another. Job characteristics and stress variables did not load in the same factor.
2. The distinction between the mediators and the outcome variables was also extremely clear. Role ambiguity and conflict loaded in one factor. They did not have any cross-loading with stress variables.
3. The distinction between the predictors and the mediators was rather clear. The job characteristics loaded in one factor while role ambiguity and conflict loaded in another. The only variable which had a cross-loading on both factors was feedback.
4. Three factors emerged by maximum likelihood extraction. Two had eigenvalues above 1 and accounted for 45.8% of the variance. The third factor had an eigenvalue of .65 and accounted for an additional 5% of the variance. This suggested that there was no large or dominant factor.

### 3.3.3. Relationships Between Incumbent and Nonincumbent Measures

Table 2 is the correlation matrix of incumbent, DOT, and OP measures of job characteristics. The DOT measure of job complexity was significantly related to all incumbent-reported job characteristics. The correlations varied from .12 to .52. The correlation between DOT complexity and incumbent-reported job complexity was .46. Similarly, Occupational Prestige (OP) was significantly related to all incumbent-reported job characteristics. The correlations between OP and job characteristics varied from .13 to .49. The correlation between OP and incumbent-reported job complexity was .42.

Incumbent-reported undesirable working conditions was significantly related to incumbent-reported job complexity ($r=-.20$). It correlated -.27 and -.17 with the DOT measure of job complexity and OP. The correlation between incumbent-reported undesirable working conditions and the DOT measure of undesirable working conditions was .11 ($p<.05$). It should be noted that the conditions assessed by these two measures are not identical. Three items such as cold, heat, and wet constitute the DOT measure of undesirable working conditions. The measure of incumbent-reported undesirable working conditions includes 13 items (conditions). Overall, a satisfactory level of convergent validity has been reported by the multiple-source data.

To further probe the convergence and discriminability of the multiple-source data, a confirmatory factor analysis was conducted using the LISREL package developed by Joreskog and Sorbom (1984). The three-source data of job complexity and two-source data of working conditions were submitted to confirmatory factor analysis. Two distinctive factors were defined. That was, incumbent-reported job complexity, DOT job complexity, and Occupational Prestige were defined as belonging to one factor. Incumbent-reported working conditions and the DOT measure of working conditions were defined as belonging to another factor. The results of the confirmatory factor analysis are presented in Appendix 6.

The multiple-source data fits into the two-factor model extremely well. The goodness of fit index was .99. The adjusted goodness of fit index was .96. The three-source data of job complexity loaded in one factor, while the two-source data of working conditions loaded in another. This suggested that the data which were obtained from different sources and gathered in different ways indicated the same, or similar, meaning for the constructs. Hence, very good evidence of convergent validity was portrayed. Further, there was sufficient evidence of discriminability, because this study was able to empirically differentiate the construct of job complexity and the construct of working conditions.

## Chapter Four

## Results

This study has tested eight hypotheses:

**Hypothesis 1.**
Job complexity, in the integrated form of skill variety, task identity, task significance, autonomy, feedback, responsibility, and PDM, is negatively related to stress.

**Hypothesis 2.**
There is a U-shaped curvilinear relationship between task significance and stress and between responsibility and stress. Employees whose jobs are high in task significance and/or responsibility and those whose jobs are low in these features will experience higher stress than employees whose jobs have intermediate levels of task significance and/or responsibility.

**Hypothesis 3.**
Autonomy has a linear, negative relationship to stress.

**Hypothesis 4.**
Growth need strength moderates the relationship between skill variety, task identity, task significance, autonomy, feedback, responsibility, PDM, and stress. The negative relationship between these job characteristics and stress will be stronger for individuals with higher growth need strength than for those with lower growth need strength.

**Hypothesis 5.**
Ability moderates the relationship between skill variety, task identity, autonomy, responsibility, PDM, and stress. The negative relationship between these job characteristics and stress will be stronger for individuals with higher abilities than for those with lower abilities.

**Hypothesis 6.**
The combination of low job complexity and unsatisfactory job context creates the highest level of stress in comparison with other combinations of job content and context.

**Hypothesis 7.**
Role ambiguity mediates the relationship between skill variety, task identity, feedback, PDM, and stress. Lack of skill variety, task identity, feedback, and PDM leads to role ambiguity, which in turn leads to job stress.

**Hypothesis 8.**
Role conflict mediates the relationship between task identity, PDM, and stress. Lack of task identity and PDM leads to role conflict, which in turn leads to job stress.

Hypothesis 1 suggests an overall tendency of the relationship between job complexity and job stress. Hypotheses 2 to 8 provide a framework for examining four inter-related issues:

1. Curvilinear and linear relationships between job characteristics and stress (Hypotheses 2 & 3).
2. P-E fit/misfit and stress (Hypotheses 4 & 5).
3. Interactive effects of job content and job context on stress (Hypothesis 6).
4. Mediating effects of role ambiguity and conflict (Hypotheses 7 & 8).

This chapter presents the results of the empirical tests of the eight hypotheses. It includes five sections. Section 4.1. introduces the results of the test of Hypothesis 1. Section 4.2. presents the tests of the curvilinear and linear relationships between job characteristics and stress (Hypotheses 2 and 3). Section 4.3. reports the tests of P-E fit and stress (Hypotheses 4 and 5). Section 4.4. examines the interactive effects of job content and context on stress (Hypothesis 6), and finally, in Section 4.5. the tests of mediating effects of role ambiguity and conflict (Hypotheses 7 and 8) are presented.

Most hypotheses were tested based on two levels. One used the summary measures of job design and another used the individual job characteristics. The logic of having a "two-level analysis" was adopted from Parker and DeCotiis (1983). Parker and DeCotiis (1983) analyzed the relationship between job design and stress at two levels: sets of stressors and individual stressors in each set. All sets of the proposed stressors including job design and role stressors were associated with stress. However, only some of the variables in each set were proven to be significant stressors. Therefore, they suggested that research relating job design to stress should treat job design and role stressors not only as categories but also as individual variables. Thus, both commonality and uniqueness of the relationships between job characteristics and stress can be explored.

## 4.1. Relationships Between Job Design and Job Stress

### -- Test of Hypothesis 1

**Hypothesis 1. Job complexity, in the integrated form of skill variety, task identity, task significance, autonomy, feedback, responsibility, and PDM, is negatively related to stress.**

Hypothesis 1 proposed a general tendency in the relationship between job complexity and stress. The test of Hypothesis 1 involved three summary measures of job complexity (incumbent-reported job complexity, DOT measure of job complexity, and OP) and four stress variables (anxiety, time stress, felt stress, and emotional exhaustion). Pearson correlations were calculated to test Hypothesis 1.

### Summary of the Results

Table 3 presents the results of the correlational analysis. Incumbent-reported job complexity was positively related to felt stress ($r=.14$, $p<.01$) and negatively related to anxiety ($r=-.12$, $p<.05$), and emotional exhaustion ($r=-.25$, $p<.01$). There was no significant relationship between incumbent-reported job complexity and time stress.

DOT measure of job complexity was negatively related to exhaustion ($r=-.21$, $p<.01$). Similarly, OP was also negatively associated with exhaustion ($r=-.18$, $p<.01$). The relationships between these two nonincumbent measures and other stress variables were not significant. Hypothesis 1 was partially supported.

### Additional Findings

<u>Job Characteristics and Stress</u>

The relationships between job characteristics and stress are also presented in Table 3. Only two out of seven characteristics, feedback and responsibility, had significant relationships with time stress. Feedback had a negative relationship with time stress ($r=-.10$, $p<.05$), while responsibility had a positive one ($r=.16$, $p<.01$). Identity, autonomy, feedback, and PDM showed a negative association with anxiety. The

correlations varied from -.12 to -.15. Variety, significance, and responsibility were the only three job characteristics which had significant relationships with felt stress. The correlations varied from .12 to .20. Six out of seven job characteristics were negatively related to emotional exhaustion. The correlations varied from -.15 to -.28. Responsibility was the only characteristic which had no significant relationship with emotional exhaustion.

Job Context and Stress

Two job contextual variables were included in this study: undesirable working conditions and perceived fairness. The former was measured by incumbent reports and a DOT measure. The latter was assessed by incumbent reports.

Incumbent-reported undesirable working conditions was positively related to all stress variables. The correlations varied from .26 to .29. DOT measure of undesirable working conditions was positively related to emotional exhaustion ($r=.16$, $p<.01$). It had no significant relationship with anxiety, time stress, and felt stress. Perceived fairness had significant relationships with all stress variables. The correlations varied from -.16 to -.43.

Role Stressors and Stress

Role ambiguity was significantly related to all stress variables. The correlations varied from .19 to .32. Similarly, the relationships between role conflict and all stress variables were significant The correlations varied from .31 to .45. The correlation of role ambiguity and conflict was .39.

Moderators and Stress

Two personal characteristics were employed for the test of S-V fit: growth need strength and S-V match. Growth need strength had no significant relationship with any of the stress variables. S-V match was negatively related to anxiety ($r=-.17$, $p<.01$) and exhaustion ($r=-.34$, $p<.01$). S-V match was not related to time stress and felt stress.

Three variables were utilized for the test of D-A fit: years of education, tenure (measured by years of work experience on the current job and years of work experience on the same line of job), and D-A match. Due to the limitation of space, Table 3 only presents the correlational analysis relating D-A match, which was negatively related to anxiety, time stress, and exhaustion. The correlations varied from -.10 to -.33. Education was not related to any of the stress variables. Years of work experience on the current job was negatively associated with exhaustion ($r=-.13$, $p<.01$). Similarly, years of work experience on the same line of job was negatively related to exhaustion ($r=-.12$, $p<.05$). These two measures were not related to other stress variables.

## Conclusion

To summarize the results of the correlational analysis, some job characteristics showed a positive relation with stress whereas others showed a negative one. Since all job characteristics were positively related to each other, and all stress variables were positively related to each other as well (see Table 3), the contrasting patterns of the correlations between job characteristics and job stress require further investigation. Moreover, some job characteristics had significant relationships with stress variables whereas others did not. Subsequent tests of moderation and mediation would help to clarify whether these characteristics had indirect and/or moderated relationships with stress, or if they were not related to stress at all. The mixed results of the correlational analysis suggested that the relationships between job design and stress might not be merely linear, nor simply negative.

## 4.2. Curvilinear/Linear Relationships Between Job Characteristics and Job Stress

### -- Tests of Hypothesis 2 and Hypothesis 3

**Hypothesis 2. There is a U-shaped curvilinear relationship between task significance and stress and between responsibility and stress. Employees whose jobs are high in task significance and/or responsibility and those whose jobs are low in these features will experience higher stress than employees whose jobs have intermediate levels of task significance and/or responsibility.**

The test of Hypothesis 2 employed curvilinear multiple regression:

$$\text{Stress} = \text{Predictor} + (\text{Predictor})^2$$

Table 4 presents the results of the tests, including betas, p values for the betas, overall F statistics for the model, and F statistics for the increments of $R^2$ for all regressions. Part A of Table 4 shows the results of testing the curvilinear relationships between the hypothesized predictors, task significance and responsibility, and stress. Part B of Table 4 presents the results involving the non-hypothesized variables.

### Summary of the Results

Two job characteristics, namely, task significance and responsibility, were hypothesized as having a U-shaped curvilinear relationship with stress. The results indicated that task significance had a U-shaped curvilinear relationship with exhaustion ($\Delta R^2$=.03, $F_{(1,400)}$=12.71, $p$<.01). However, the curvilinear relationship between responsibility and stress was not significant. Therefore, Hypothesis 2 was partially supported.

Eight regressions were conducted to test Hypothesis 2. Only one significant curvilinear relationship was found, which accounted for 12.5% of the regressions performed. The results are shown in Part A of Table 4.

### Additional Findings

In addition to the test of the curvilinear relationship between the two hypothesized predictors, task significance and responsibility, and

stress, similar analyses were also performed using the other five job characteristics and three summary measures of job complexity. Thirty-two regressions were conducted. The results are shown in Part B of Table 4.

Five curvilinear relationships were detected, which accounted for approximately 15.6% of the additional tests performed. Task identity had a curvilinear relationship with felt stress ($\Delta R^2$=.023, $F_{(1,402)}$=9.46, $p$<.01) and exhaustion ($\Delta R^2$=.01, $F_{(1,402)}$=4.15, $p$<.05). For job complexity and stress, the curvilinear relationships occurred between incumbent-reported job complexity and exhaustion ($\Delta R^2$=.012, $F_{(1,387)}$=5.00, $p$<.05), between DOT complexity and exhaustion ($\Delta R^2$=.039, $F_{(1,404)}$=17.11, $p$<.01), and between OP and exhaustion ($\Delta R^2$=.018, $F_{(1,404)}$=7.66, $p$<.01).

## Conclusion

Overall, forty regressions (40) resulted in six significant curvilinear relationships, which accounted for 15% (one/eighth) of the total tests conducted. The curvilinear relationships are portrayed graphically in Figure 2. These findings have the following characteristics:

1. Consistent with Hypothesis 2, <u>all</u> significant curvilinear relationships were U-shaped, suggesting both low and high job complexity are associated with stress (especially emotional exhaustion). Moreover, all of these curvilinear relationships showed an unbalanced, shallow U-shape. The highest stress occurred with low complexity, the curves gradually flattened along with an increase in job complexity. This indicated that although both low and high job complexity were related to stress, the stress level of those who had high complexity was not nearly as high as those with low complexity.
2. Contrary to the prediction of Hypothesis 2, the curvilinearity occurred not only on job characteristics-stress relationships but also on job complexity-stress relationships. Among the six

curvilinear relationships, three involved job characteristics (one for task significance and two for task identity) and the other three involved job complexity. It should be emphasized that all three measures of job complexity showed a curvilinear relationship with exhaustion.

3. Five out of six of the curvilinear relationships have concentrated on emotional exhaustion.

**Hypothesis 3. Autonomy has a linear, negative relationship to stress.**

The essence of Hypothesis 3 was to differentiate the effects of different job characteristics on stress. It was hypothesized that autonomy would not have a curvilinear relationship with stress. Instead, it would have a linear, negative relationship with stress.

**Summary of the Results**

Simple regression was employed to test Hypothesis 3, which involved the variable autonomy and four stress variables. Thus, four regressions were performed. Two significant findings were detected which accounted for 50% of the total tests. Autonomy was negatively related to anxiety and exhaustion. However, it was not significantly related to time stress and felt stress. Hypothesis 3 was partially supported.

Although the actual test did not fully support Hypothesis 3, it was found that autonomy did not have a curvilinear relationship with any of the stress variables (see Table 4).

## 4.3. P-E Fit/Misfit and Stress

**-- Tests of Hypothesis 4 and Hypothesis 5**

Hypotheses 4 and 5 were designed to test the relationship between P-E fit/misfit and stress. In particular, Hypothesis 4 suggested that the fit between the environmental supplies and personal needs (S-V fit)

moderates the relationship between job design and stress. Hypothesis 5 outlined that the fit between environmental demands and individual ability (D-A fit) moderates the relationship between job design and stress.

The test of Hypotheses 4 and 5 employed two types of hierarchical multiple regression: 1) moderated multiple regression; and 2) curvilinear moderated multiple regression.

1) moderated multiple regression

The typical moderated regression (Evans, 1991) was utilized when the tests involved variables which have a linear relationship to each other. The regression is as follows:

Stress = Predictor + Moderator + Predictor x Moderator.

The cross-product of the predictor and the moderator carried the interaction term. Only if an effect for the indicated moderator was at $p<.05$ or better, was the proposed moderator effect considered as statistically significant. In that case, the direction of the moderation was examined.

2) curvilinear moderated multiple regression

As presented in 4.2., six curvilinear relationships between job design variables and stress were detected. They occurred in the linkages of task significance-exhaustion, task identity-felt stress, task identity-exhaustion, incumbent-reported job complexity-exhaustion, DOT complexity-exhaustion, and OP-exhaustion. When the tests of Hypotheses 4 and 5 involved these six pairs of variables, another type of hierarchical multiple regression was used. This regression differs from the moderated multiple regression by adding a squared form of the predictor and an interactive form of the squared form of the predictor and the moderator. For the convenience of presentation, this regression was called curvilinear moderated multiple regression:

$$\text{Stress} = \text{Predictor} + (\text{Predictor})^2 + \text{Moderator} + \text{Predictor} \times \text{Moderator} + (\text{Predictor})^2 \times \text{Moderator}.$$

Two interactive effects were tested in the above regression. One

involved predictor x moderator, and the other involved (Predictor)$^2$ x Moderator. Only if an effect of any one of the indicated interactions was at $p<.05$ or better, was the proposed moderator effect considered as statistically significant. In this case, the shape of the moderation was examined. It should be noted that the moderated relationships, derived from the curvilinear moderated multiple regression, are curvilinear.

The presentation of the results are divided into two sections. 4.3.1. presents the results of testing Hypothesis 4 (S-V fit and stress), which involved two moderators: growth need strength and S-V match. 4.3.2. presents the tests of Hypothesis 5 (D-A fit and stress), including three moderators such as education, tenure, and D-A match. For each moderator, the results obtained from the two types of hierarchical multiple regression are presented separately.

### 4.3.1. Tests of S-V Fit and Stress

**Hypothesis 4. Growth need strength moderates the relationship between skill variety, task identity, task significance, autonomy, feedback, responsibility, PDM, and stress. The negative relationship between these job characteristics and stress will be stronger for individuals with higher growth need strength than for those with lower growth need strength.**

**Growth Need As A Moderator**

**Summary of the Results**

<u>Moderator Effects of Growth Need Strength (GNS) on Linear Relationships Between Job Design and Stress</u>

Part A of Table 5 shows the results of the moderated multiple regression analysis. Table 5 includes the betas, p values of the betas, F statistics for the main effects, overall F statistics for the model, and F statistics for the increments of $R^2$. Because seven predictors (job characteristics) and four stress variables were involved in the tests of Hypothesis 4, twenty-five regressions were performed (the tests involving identity-felt stress, identity-exhaustion, and significance-exhaustion were conducted separately due to the curvilinearity of these variables).

Four significant moderator effects were detected, which accounted for 16% of the regressions performed.

Feedback and GNS had joint effects on time stress ($\Delta R^2$=.01, $F_{(1,386)}$=4, $p$<.05), anxiety ($\Delta R^2$=.013; $F_{(1,386)}$=5.2, $p$<.05) and emotional exhaustion ($\Delta R^2$=.02, $F_{(1,386)}$=8.2, $p$<.01). PDM and GNS jointly affected anxiety ($\Delta R^2$=.017, $F_{(1,386)}$=6.8, $p$<.01).

The directions of these moderator effects are portrayed graphically in Figure 3. The method of illustrating moderator effects was developed by Peters and Champoux (1979) and has been used in numerous studies (e.g., Dwyer & Ganster,1991; Johns et al., 1992). It should be noted that this method demonstrates categories of moderator effects (e.g., high vs. low GNS) and does not take full account of the effects of interval measures. Nevertheless, it provides a clear and sufficient presentation of the basic pattern of the moderator effects examined in this study.

The results indicated that the negative relationship between job characteristics and stress was stronger among individuals with lower growth need strength than for those with higher growth need strength. In the predictions of anxiety, time stress, and emotional exhaustion, a positive relationship between feedback, PDM, and these stress variables was reported for individuals with higher GNS, whereas a negative relationship was found for those with lower GNS. Apparently, the direction of the moderator effects was contrary to that of the hypothesis.

Moderator Effects of GNS on Curvilinear Relationships Between Job Design and Stress

Part A of Table 6 shows the tests of interaction using the curvilinear moderated regression. Three regressions resulted in one significant interaction which accounted for 33.3% of the tests performed. This interaction occurred for $(\text{Identity})^2$ x GNS in predicting exhaustion ($\Delta R^2$=.035, $F_{(1,395)}$=11.5, $p$<.01). The shape of the moderator effect is portrayed graphically in Figure 4. The method of illustrating moderator

effects on curvilinear relationships was adopted from Champoux (1992).

Among individuals in the high GNS group, the relationship between identity and exhaustion was an unbalanced U-shape. Nevertheless, although both high and low levels of identity were associated with exhaustion for the high GNS group, those with low identity experienced a much higher level of exhaustion than those with high identity. Among individuals in the low GNS group, an unbalanced inverted U-shaped relationship occurred between identity and exhaustion. Low identity was associated with the lowest exhaustion. High identity was related to an intermediate level of exhaustion.

To view the tests of moderator effects of GNS as a whole, twenty-eight regressions resulted in five significant interactions which accounted for approximately 18% of the total tests performed.

**Additional Tests**

In addition to the tests of the hypothesized relationships, similar analysis was performed using the non-hypothesized variables of job design (three summary measures of job complexity). The purpose of the additional analysis was to compare the predictive powers, between job characteristics and job complexity, in the test of moderation. The results are shown in Part B of Tables 5 and 6. GNS did not moderate any relationship between job complexity and stress.

**S-V Match As A Moderator**

**Summary of the Results**

<u>Moderator Effects of S-V Match on Linear Relationships Between Job Design and Stress</u>

Part A of Table 7 shows the results of the moderated multiple regression analysis. The tests involving identity-felt stress, identity-exhaustion, and significance-exhaustion are not included in Table 7 because these pairs have curvilinear relationships.

Twenty-five regressions resulted in two significant interactions which accounted for 8% of the tests conducted. Identity and S-V match had an interactive effect on anxiety ($\Delta R^2$=.013; $F_{(1,391)}$=5.42, $p$<.05). Responsibility and S-V match jointly affected time stress ($\Delta R^2$=.01; $F_{(1,402)}$=4.21, $p$<.05).

Figure 5 portrays the direction of these two interactions. S-V match moderated the relationship between identity and anxiety. The negative relationship between identity and anxiety was stronger among those who perceived a lack of S-V match than among those who perceived S-V match. The direction of this effect was similar to those found in the tests of GNS (Figure 3). It is worth noting that those who perceived S-V mismatch reported a higher level of anxiety than those who perceived S-V match. This difference in anxiety was particularly apparent when the level of identity was low and was minimized gradually with an increase of identity.

The moderator effect of S-V match on the responsibility-time stress relationship was unique (Figure 5). Incremental responsibility was not associated with time stress for those who perceived S-V match, whereas, it had a positive relationship with time stress for those who perceived a lack of S-V match. The direction of this interaction was consistent with the prediction of the hypothesis.

Moderator Effects of S-V Match on Curvilinear Relationships Between Job Design and Stress

Part A of Table 8 shows the tests of moderator effects of S-V match on the relationships of identity-felt stress, identity-exhaustion, and significance-exhaustion. Three curvilinear moderated regressions resulted in three significant interactions, which accounted for 100% of the tests conducted.

Identity and S-V match jointly affected felt stress ($\Delta R^2$=.01; $F_{(1,400)}$=4.15, $p$<.05), and exhaustion ($\Delta R^2$=.01; $F_{(1,400)}$=4.66, $p$<.05).

Significance and S-V match had an interactive effect on exhaustion ($\Delta R^2$=.016; $F_{(1,397)}$=7.62, $p$<.01). The shapes of the interactions are portrayed in Figure 6. Two shallow, U-shaped relationships were found between identity and felt stress for both high and low S-V match groups. With low identity, those who perceived S-V mismatch reported a higher level of felt stress than those who perceived S-V match. With high identity, those who perceived S-V mismatch seemed to experience a lower level of felt stress than those who perceived S-V match. The relationships between identity and exhaustion are two unbalanced U-shaped curves for both high and low S-V match groups. The shapes of these two curves are near to that of a positive, linear curve, suggesting that incremental identity was associated with exhaustion for both groups. However, those who perceived S-V mismatch reported a higher level of exhaustion than those who perceived S-V match. S-V match also moderated the relationship between significance and exhaustion. Among those who perceived a lack of S-V match, a U-shaped relationship occurred between significance and exhaustion, whereas, a shallow, inverted U-shaped relationship was found among those who perceived S-V match. One commonality of these three moderator effects is that those who perceived a lack of S-V match consistently reported a higher level of stress than those who perceived S-V match. This is supportive of the notion of S-V fit and stress.

To view the tests of the moderator effects of S-V match as a whole, twenty-eight regressions resulted in five significant effects, which accounted for 18% of the tests performed.

**Additional Tests**

Similar analysis was conducted using the three summary measures of job complexity. The results are presented in Part B of Tables 7 and 8. No significant moderator effect of S-V match was found.

### 4.2.2. Tests of D-A Fit and Stress

**Hypothesis 5. Ability moderates the relationship between skill variety, task identity, autonomy, responsibility, PDM, and stress. The negative relationship between these job characteristics and stress will be stronger for individuals with higher abilities than for those with lower abilities.**

Education, tenure, and perceived match between individual abilities and job demands (D-A match) were employed to assess the moderator effects of D-A fit/misfit. The results relating the three moderators are presented separately below.

**Education As A Moderator**

**Summary of the Results**

Moderator Effects of Education on Linear Relationships Between Job Design and Stress

Part A of Table 9 shows the results of the moderated multiple regression analysis. Since five predictors (variety, identity, autonomy, responsibility, and PDM) and four stress variables were involved in the test of Hypothesis 5, eighteen regressions were performed. The tests involving identity-felt stress and identity-exhaustion are not included in Table 9 due to their curvilinearity. No significant moderator effect of education was found.

Moderator Effects of Education on Curvilinear Relationships Between Job Design and Stress

Part A of Table 10 shows the tests of moderator effects of education on the relationships of identity-felt stress and identity-exhaustion. A significant moderator effect occurred for $(\text{Identity})^2$ x education in predicting exhaustion ($\Delta R^2 = .01$; $F_{(1,398)} = 4.2$, $p < .05$). The shape of the moderator effect is portrayed in Figure 7. For those with a higher education, the identity-exhaustion relationship was U-shaped. For those with a lower education, the identity-exhaustion relationship was nearly a positive, linear one. This result provided some support to Hypothesis 5

because individuals with a lower education did find incremental task identity stressful. However, it was not totally supportive to Hypothesis 5, since Hypothesis 5 did not propose the curvilinear relationship between identity and exhaustion for the high education group.

Altogether, twenty regressions were conducted to test the moderator effects of education. Only one significant effect was found, which accounted for 5% of the tests conducted.

### Additional Findings

Additional tests of the moderator effects of education were conducted using the non-hypothesized job design variables such as task significance, feedback, incumbent-reported job complexity, DOT job complexity, and occupational prestige (OP). The results are presented in Part B of Tables 9 and 10. These additional tests resulted in two significant findings. Education moderated the relationship between DOT job complexity and felt stress ($\Delta R^2$=.014; $F_{(1,407)}$=5.81, $p$<.05). It also moderated the relationship between OP and felt stress ($\Delta R^2$=.012; $F_{(1,413)}$=5.02, $p$<.05).

Figure 8 shows the direction of the moderator effects of education. A slightly negative relationship between job complexity/OP and felt stress occurred for those with a higher education, whereas, the relationship between job complexity/OP and felt stress was positive for those with a lower education. These results indicated that job complexity was not a stressor for those with a higher education. However, it created stress for those with a lower education. These findings were supportive of the prediction of Hypothesis 5.

### Tenure As A Moderator

Two variables were utilized to assess tenure: years of work experience on the current job, and years of work experience on the same line of job.

## Summary of the Results

### Moderator Effects of Tenure on Linear Relationships Between Job Design and Stress

Part A of Table 11 shows the results of moderated multiple regression analysis. Five predictors (variety, identity, autonomy, responsibility, and PDM), two measures of the moderator (work experiences on the current job and work experiences on the same line of job), and four stress variables were involved. Thirty-six regressions resulted in two significant moderator effects, which accounted for approximately 5.6% of the tests conducted. The tests involving identity-felt stress and identity-exhaustion are not included in Table 11.

Years of work experience on the same line of job moderated responsibility-time stress relationship ($\Delta R^2$=.012; $F_{(1,391)}$=4.85, $p$<.05), and PDM-time stress relationship ($\Delta R^2$=.01; $F_{(1,402)}$=4.07, $p$<.05). The directions of these effects are presented in Figure 9. Among those who had longer work experiences on the same line of job, the relationship between responsibility/PDM and time stress was negative, whereas, among those who had less work experience, the relationship between responsibility/PDM and time stress was positive. These findings have provided support for Hypothesis 5.

### Moderator Effects of Tenure on Curvilinear Relationships Between Job Design and Stress

Part A of Table 12 presents the tests of moderator effects of tenure on the relationships of identity-felt stress and identity-exhaustion using the curvilinear moderated regression. Tenure was measured by two variables, thus, four regressions were conducted. No significant interaction was found.

Altogether, forty regressions were performed to test the moderator effects of tenure. Only two significant effects were detected, which accounted for 5% of the total tests conducted.

### Additional Tests

Similar analysis was also conducted using the job design variables which were not hypothesized as components of D-A fit. The results are presented in Part B of Tables 11 and 12. No significant finding was detected.

## D-A Match As A Moderator

### Summary of the Results

Moderator Effects of D-A Match on Linear Relationships Between Job Design and Stress

Part A of Table 13 shows the results of moderated multiple regression analysis. Eighteen regressions resulted in one significant interaction which accounted for 5.6% of the tests conducted.

D-A match moderated the relationship between responsibility and time stress ($\Delta R^2$=.017; $F_{(1,392)}$=7.14, $p$<.01). The direction of the moderator effect is portrayed in Figure 10. Among those who perceived D-A match, incremental responsibility was not related to time stress, whereas, the responsibility-time stress relationship was positive for those who perceived a lack of D-A match. Hypothesis 5 was supported here.

Moderator Effects of D-A Match on Curvilinear Relationships Between Job Design and Stress

Part A of Table 14 shows the tests of moderator effects of D-A match on the relationships of identity-felt stress and identity-exhaustion using curvilinear moderated regression analysis. No significant moderator effect was found.

Overall, twenty regressions were conducted in the tests of moderator effects of D-A match. One significant effect was found, which accounted for 5% of the total tests conducted.

**Additional Findings**

Similar analysis was performed using the job design variables which were not proposed as components of D-A fit. These variables included significance, feedback, incumbent-reported job complexity, DOT job complexity, and OP. Twenty regressions resulted in seven significant findings, which accounted for 35% of the additional tests. The results of these additional tests are presented in Part B of Tables 13 and 14.

Among seven significant interactions, five occurred on the linear linkages of job design variables and stress. D-A match moderated the relationship between feedback and felt stress ($\Delta R^2$=.011; $F_{(1,412)}$=4.58, $p$<.05). D-A match and DOT job complexity jointly affected anxiety ($\Delta R^2$=.01; $F_{(1,403)}$=4.39, $p$<.05), and time stress ($\Delta R^2$=.012; $F_{(1,403)}$=4.94, $p$<.05). D-A match also moderated the OP-anxiety relationship ($\Delta R^2$=.013; $F_{(1,403)}$=5.7, $p$<.05), and OP-time stress relationship ($\Delta R^2$=.01; $F_{(1,410)}$=4.18, $p$<.05).

The directions of these interactions are portrayed in Figure 10. Two commonalities of the moderator effects of D-A match have been revealed. One, those who perceived a lack of D-A match generally reported higher levels of stress than those who perceived D-A match. Two, for those who perceived a D-A match, the relationships between job complexity (or characteristics) and stress were negative. However, for those who perceived a lack of D-A match, the relationships between job complexity (or characteristics ) and stress were positive. In other words, job complexity appeared to be a stressor for those whose abilities were insufficient for their jobs, whereas, job complexity was not a stressor, and even helped to reduce stress, for those whose abilities were adequate for their jobs. These findings supported Hypothesis 5.

Another two significant moderator effects of D-A match occurred in the DOT job complexity-exhaustion relationship ($\Delta R^2$=.02; $F_{(1,402)}$=9.71, $p$<.01), and in the OP-exhaustion relationship ($\Delta R^2$=.009; $F_{(1,402)}$=4.2, $p$<.05). The statistical results of these two effects are shown in Part B of Table 14. Their shapes of moderation are demonstrated in Figure 11. A shallow

U-shaped relationship occurred between the two summary measures of job complexity and exhaustion for both low and high D-A match groups. However, the low D-A match group reported a higher level of exhaustion than the high D-A match group. Further, the curves for the low D-A match group were skewed. The highest exhaustion occurred for those who experienced a low level of D-A match and a high level of job complexity. Again, Hypothesis 5 was supported.

## Conclusion

Figure 12 provides a summary of the statistically significant moderator effects reported in the tests of S-V fit (Hypothesis 4). The tests of Hypothesis 4 involved seven job characteristics, two moderators (GNS and S-V match), and four stress variables. Fifty-six (56) regressions resulted in ten significant moderator effects, which accounted for approximately 18% of the total tests conducted. Additional tests were conducted using the three measures of job complexity. GNS and S-V match did not moderate the relationships between job complexity and stress. The tests of S-V fit and stress resulted in following findings:

1. GNS had five moderator effects on the relationships of identity-exhaustion, feedback-anxiety, feedback-time stress, feedback-exhaustion, and PDM-anxiety. The negative relationship of job characteristics and stress was stronger for those with lower GNS than for those with higher GNS. The direction of the moderator effects was contrary to the prediction of Hypothesis 4.
2. S-V match had five moderator effects as well. They occurred on the linkages of identity-anxiety, identity-felt stress, identity-exhaustion, significance-exhaustion, and responsibility-exhaustion. The direction of the moderator effects of S-V match differed from that of GNS. The individuals who perceived a lack of S-V match consistently reported a higher level of stress than those who perceived S-V match. This may indicate that a lack of S-V match

itself can be a stressor. Further, incremental responsibility was not associated with increased time stress for the individuals who perceived S-V match. However, it did increase time stress for those who perceived a lack of S-V match. The direction of the moderator effects of S-V match was consistent with the prediction of Hypothesis 4.

3. The moderator effects of GNS and S-V match have concentrated on the relationships between job characteristics and stress. GNS and S-V match did not moderate the relationships between job complexity and stress.

Figure 13 summarizes the statistically significant moderator effects reported in the tests of D-A fit (Hypothesis 5). The tests of Hypothesis 5 involved five job characteristics, three moderators (measured by four variables), and four stress variables. Eighty (80) regressions resulted in four significant moderator effects, which accounted for only 5% of the total tests performed.

Additional tests were conducted using the job design variables which were not outlined in Hypothesis 5. These tests involved five predictors (significance, feedback, incumbent-reported job complexity, DOT job complexity, and OP), three moderators (measured by four variables), and four stress variables. Eighty (80) regressions resulted in nine significant effects, which accounted for 11.3% of the additional tests conducted.

Overall, the findings of D-A fit and stress had two characteristics:

1. The directions (shapes) of the moderator effects of all three moderators, education, tenure, and D-A match, were consistently supportive to the prediction of Hypothesis 5. The relationship between job characteristics (complexity) and stress was positive for those with a lower education, shorter tenure, and a lack of D-A match. However, the relationship between job characteristics

(complexity) and stress was negative for those who had a higher education, longer tenure, and perceived D-A match.

2. The occurrences of the moderation were not exactly as outlined by Hypothesis 5. Hypothesis 5 suggested that ability moderates the relationships between job characteristics and stress. The actual tests resulted in five moderator effects on the relationships of job characteristics and stress. Further, they detected eight effects on the relationships of job complexity and stress.

### 4.4. Interactive Effects of Job Content and Job Context on Stress -- Tests of Hypothesis 6

**Hypothesis 6. The combination of low job complexity and unsatisfactory job context creates the highest level of stress in comparison with other combinations of job content and context.**

Though Hypotheses 4, 5, and 6 all examined interactions, their emphases were different. Hypotheses 4 and 5 focused on the interactions between person and environment (P-E). They suggested that stress occurs when environmental characteristics are combined with certain personal characteristics. Hypothesis 6, on the other hand, examined the interactions between different components of the environment. It suggested that stress occurs when unfavourable environmental characteristics are combined. In other words, stress results not from a single aspect of the work environment, but from the joint effects of low job complexity and poor context. Further, Hypothesis 6 suggested that the combination of low job complexity and unsatisfactory job context would create a higher level of stress than their additive effects.

The level of analysis used in the test of Hypothesis 6 was slightly different from those used in the tests of Hypotheses 4 and 5. The tests of Hypotheses 4 and 5 used "two-level analysis" which incorporated individual job dimensions and summary measures of job complexity. The test of Hypothesis 6 was based solely on the summary measures of job complexity.

Three variables measured job content: incumbent-reported job complexity, DOT measure of job complexity, and OP. Job context was assessed by two variables: undesirable working conditions and perceived fairness. The former was assessed by incumbent reports and a DOT measure. The latter was measured by incumbent reports. The presentations of the results are divided into two sections. 4.4.1. introduces the tests of interactions of job complexity and working conditions. 4.4.2. presents the tests of interactions of job complexity and perceived fairness.

The tests of Hypothesis 6 involved three statistical techniques: 1) moderated multiple regression, 2) curvilinear moderated multiple regression, and 3) Scheffe's test of planned contrast.

1) Moderated multiple regression

The moderated multiple regression was recommended by Cohen and Cohen (1983) as a rigorous method of testing for interaction. It was used in the test of Hypothesis 6 involving the variables which had linear relationships. Anxiety, time stress, and felt stress had linear associations with the three measures of job complexity. The tests of Hypothesis 6 involving these three stress variables used the moderated multiple regression:

Stress = Complexity + Context + Complexity x Context

The cross-product of complexity and context carried the interaction term. Only if an effect for the indicated interaction was at $p < .05$ or better, was the proposed interaction considered as statistically significant. In that case, the direction of the interaction was examined.

2) Curvilinear moderated multiple regression

As noted in 4.3., the test of moderator effects on the curvilinear linkage of predictor-outcome should employ the curvilinear moderated multiple regression.

Exhaustion had a curvilinear relationship with all three measures of job complexity. Therefore, the curvilinear moderated multiple regression was employed as long as the tests involving the relationships of

incumbent-reported job complexity-exhaustion, DOT job complexity-exhaustion, and OP-exhaustion. The curvilinear moderated regression is as follows:

$$\text{Stress} = \text{Complexity} + (\text{Complexity})^2 + \text{Context} + \text{Complexity} \times \text{Context} + (\text{Complexity})^2 \times \text{Context}$$

Two interactions were tested in the above regression. One involved complexity x context, while another involved $(\text{complexity})^2$ x context. Only if an effect of any one of the indicated interactions was at $p<.05$ or better, was the proposed interaction considered statistically significant. In this case, the shape of the interaction was examined. The moderated relationships, derived from the curvilinear moderated regressions, are curvilinear.

3) Scheffe's test of planned contrast

Hypothesis 6 involved contrasts of stress levels between one group (combination of low job complexity and poor context) and other groups (e.g., low complexity and good context; high complexity and good context; and high complexity and poor context). It hypothesized that the combination of low job complexity and poor context will create a higher level of stress than other combinations of job complexity and context.

Neter, Wasserman and Kutner (1985) recommended Scheffe's method as an appropriate technique of group contrasts. In this study, Scheffe's method was preferred over other alternatives such as Tukey, because Scheffe's method has the propensity to conduct contrasts among groups which have different sizes (as is the case here). It should be emphasized that the statistical evidence of the main effects and interactive effects of job complexity and context was provided by the hierarchical multiple regression, not by the Scheffe's test. The reason for incorporating Scheffe's test into the test of Hypothesis 6 was to add a means of visual reconnaissance of the stress levels among groups.

Job complexity and context (measured by working conditions and perceived fairness) were divided by quartile to create a 4 x 4 design which consisted of sixteen possible combinations of job complexity and context. This sixteen-group split analysis was adopted from Karasek (1979). The DOT measure of working conditions was excluded in Scheffe's test. This measure was severely skewed (mean= 13, median=0, range 0-10) and therefore it was not possible to employ a quartile split.

Three measures of job complexity, two measures of context, and four measures of stress were involved. Thus, Scheffe's test was conducted based on twenty-four 4 x 4 designs. The default alpha was .05.

### 4.4.1. Interactions of Job Complexity and Working Conditions

Table 15 shows the moderated multiple regression analysis of the interactive effects of job complexity and working conditions on anxiety, time stress, and felt stress. Table 16 shows the curvilinear moderated multiple regression analysis of the inceractive effects of job complexity and working conditions on exhaustion. Both tables include the betas, p values of the betas, F statistics for the main effects, overall F statistics for the model, and F statistics for the increments of $R^2$.

## Summary of the Results

Main Effects of Job Complexity and Working Conditions

As presented in 4.1., the correlational analysis indicated that incumbent-reported job complexity was positively related to felt stress and negatively related to anxiety and exhaustion. It was not related to time stress. DOT measure of job complexity and OP were negatively related to exhaustion. They were not associated with other stress variables. Incumbent-reported working conditions had a positive relationship with all stress variables. DOT measure of working conditions was positively related to exhaustion. It was not associated with other stress variables.

Tables 15 and 16 show the main effects of job complexity and working conditions on stress. When these two variables entered the regressions simultaneously to predict stress, incumbent-reported complexity and DOT measure of complexity had positive effects on felt stress and negative effects on exhaustion. They were not significantly related to anxiety and time stress. OP had a negative effect on exhaustion. It was not associated with anxiety, time stress, and felt stress.

The main effect of incumbent-reported working conditions on all stress variables was very strong and consistent. DOT measure of working conditions had a positive effect on exhaustion. It was not associated with other stress variables.

Interactive Effects of Job Complexity and Working Conditions on Anxiety, Time Stress, and Felt Stress

The moderated multiple regression analysis involved three measures of job complexity, two measures of working conditions (incumbent-reported working conditions and a DOT measure of working conditions), and three stress variables (the analysis relating exhaustion was conducted separately due to its curvilinearity). Eighteen regressions resulted in one significant interactive effect, which accounted for 5.6% of the tests conducted.

Incumbent-reported working conditions moderated the relationship between incumbent-reported job complexity and anxiety ($\Delta R^2 = .01$; $F_{(1,385)} = 4.29$, $p < .05$). The direction of the moderator effect is portrayed in Figure 14. A negative relationship between job complexity and anxiety was found among those who had poor working conditions. Among those who had good working conditions, the relationship between job complexity and anxiety was positive. The combination of low complexity and poor working conditions was associated with the highest anxiety. Hypothesis 6 was supported.

Interactive Effects of Job Complexity and Working Conditions on Exhaustion

Table 16 shows the tests of interactions between job complexity and working conditions in predicting exhaustion. The curvilinear moderated regression was employed. Three measures of job complexity, two measures of working conditions, and one stress variable were involved. Six regressions resulted in one significant interactive effect, which accounted for 16.7% of the tests conducted.

The DOT measure of working conditions moderated the relationship between incumbent-reported job complexity and exhaustion ($\Delta R^2$=.022; $F_{(1,383)}$=9.4, $p$<.01). The shape of the interaction is portrayed in Figure 15. For those with good working conditions as well as those with poor conditions, a U-shaped relationship between job complexity and exhaustion occurred. The combination of high job complexity and poor conditions and the combination of good conditions and low job complexity reported a similar level of exhaustion.

Overall, twenty-four regressions were conducted to test the interactive effects of job complexity and working conditions on stress. Two interactions were detected, which accounted for 8.3% of the tests conducted.

Additional Tests

Scheffe's test was conducted to examine Hypothesis 6. The results are presented in Table 17. Part A of Table 17 shows the results of the sixteen-group contrasts using incumbent-reported job complexity. Part B and Part C of Table 17 present the results obtained from the nonincumbent measures of job complexity.

For the tests using incumbent-reported job complexity and working conditions (Part A of Table 17), three levels of anxiety were reported. Group 1 (high complexity and poor conditions) and Group 13 (low complexity and poor conditions) rated the highest anxiety. Groups 3, 7, 11, 12, and 16 had the lowest level of anxiety. These jobs were characterized by

lower complexity and better conditions. The remaining groups reported an intermediate level of anxiety.

Relatively similar results were obtained in the test involving exhaustion. Groups 13, 14, and 6 reported the highest level of exhaustion. Groups 3, 4, 8, 11, and 12 experienced the lowest exhaustion. The remaining groups had an intermediate level of exhaustion.

Two levels of time stress and felt stress were reported in Scheffe's test. Good conditions combining low complexity reported lower time stress and felt stress than other combinations.

The same tests were conducted by using the nonincumbent measures of job complexity. The results are shown in Parts B and C of Table 17. They were not identical to those derived from the incumbent-reported data, but were similar in patterns.

### 4.4.2. Interactions of Job Complexity and Perceived Fairness

Table 18 shows the moderated multiple regression analysis of the interactive effects of job complexity and perceived fairness on anxiety, time stress, and felt stress. Table 19 shows the curvilinear moderated multiple regression analysis of the interactive effects of complexity and perceived fairness on exhaustion. Both tables include the betas, p values of the betas, F statistics for the main effects, overall F statistics for the model, and F statistics for the increments of $R^2$.

#### Summary of Results

Main Effects of Job Complexity and Perceived Fairness

Incumbent-reported job complexity had a positive effect on time stress and felt stress, and a negative effect on exhaustion. It did not have a main effect on anxiety. Both DOT job complexity and OP had a negative effect on exhaustion. They were not related to anxiety, time stress, and felt stress. Perceived fairness had negative main effects on all stress variables. The results are presented in Tables 18 and 19.

Interactive Effects of Job Complexity and Perceived Fairness on Anxiety, Time Stress, and Felt Stress

The moderated multiple regression was employed to test the interactive effects of job complexity and perceived fairness on anxiety, time stress, and felt stress. Three measures of job complexity, one measure of perceived fairness, and three stress variables were involved. Thus, nine regressions were conducted. Four significant interactions were detected, which accounted for 44.4% of the total tests conducted. The results are shown in Table 18.

Four significant interactions occurred. Incumbent-reported job complexity and perceived fairness jointly affected anxiety ($\Delta R^2$=.01; $F_{(1,389)}$=4.31, $p$<.05), time stress ($\Delta R^2$=.016; $F_{(1,389)}$=6.92, $p$<.01), and felt stress ($\Delta R^2$=.01; $F_{(1,389)}$=4.25, $p$<.05). DOT measure of job complexity and perceived fairness had an interactive effect on anxiety ($\Delta R^2$=.01; $F_{(1,405)}$=4.48, $p$<.05).

Figure 16 shows the directions of these four interactions. They look almost identical. The relationships of job complexity-anxiety, job complexity-time stress, and job complexity-felt stress were negative among those who perceived unfairness, whereas, these relationships were positive for those who perceived fairness. The highest stress occurred for the combination of low complexity and perceived unfairness. These findings supported Hypothesis 6.

Interactive Effects of Job Complexity and Perceived Fairness on Exhaustion

Table 19 shows the results of the curvilinear moderated multiple regression analysis. Three regressions resulted in one significant finding, which accounted for 33.3% of the tests conducted.

The significant interaction occurred on $(OP)^2$ x perceived fairness in predicting exhaustion ($\Delta R^2$=.026; $F_{(1,398)}$=13.54, $p$<.01). The shape of the interaction is portrayed in Figure 17. A skewed U-shaped relationship between OP and exhaustion was found for those who perceived fairness and

whose who perceived unfairness. However, it seems that individuals who perceived unfairness experienced a higher level of exhaustion than those who perceived fairness.

Altogether, twelve regressions were conducted to test the interactive effects of job complexity and perceived fairness on stress. Five significant interactions were detected, which accounted for 41.6% of the total tests conducted.

### Additional Tests

Table 20, which consists of three parts, shows the results of Scheffe's test based on sixteen-group contrasts. The results using incumbent-reported job complexity are presented in Part A. Parts B and C of Table 20 present the results obtained from the nonincumbent measures of job complexity.

The tests using incumbent-reported job complexity resulted in similar results from anxiety and exhaustion. Groups 1, 5, and 13 reported the highest level of anxiety and exhaustion. The only difference was reflected in the members of the "least stressful group". Groups 11 and 12 experienced the least amount of anxiety while Groups 4, 11, 12, and 16 reported the least amount of exhaustion.

In the tests involving time stress and felt stress, the far left groups (Groups 1, 5, 9, & 13) rated higher on time stress and felt stress than Groups 12 and 16. Again, relatively similar results were found when the nonincumbent measures were used (Part B and Part C of Table 20).

### Conclusion

The findings of testing Hypothesis 6 had the following characteristics:

1. The main effects of working conditions and perceived fairness on stress were much stronger and more consistent than that of job complexity.

2. The interactive effects of job complexity and perceived fairness received stronger support than that of job complexity and working conditions. Five interactive effects were detected from the relationships of complexity-perceived fairness. They accounted for approximately 42% of the total tests conducted. Two interactions were detected from the relationships of complexity-working conditions, however, they accounted for only 8.3% of the tests conducted.

3. The directions of the moderator effects were generally consistent with the prediction of Hypothesis 6 (Figures 14 and 16). That is, the combination of low complexity and poor context was consistently associated with the highest levels of anxiety, time stress, and felt stress.

4. Multiple-source data of job complexity resulted in very similar results (Figure 16).

### 4.5. Mediating Tests of Role Stressors

**-- Tests of Hypothesis 7 and Hypothesis 8**

**Hypothesis 7. Role ambiguity mediates the relationship between skill variety, task identity, feedback, PDM, and stress. Lack of skill variety, task identity, feedback, and PDM leads to role ambiguity, which in turn leads to job stress.**

**Hypothesis 8. Role conflict mediates the relationship between task identity, PDM, and stress. Lack of task identity and PDM leads to role conflict, which in turn leads to job stress.**

Hypotheses 7 and 8 involved tests of mediation. According to Venkatraman (1989), the mediation perspective specifies the existence of intervening (indirect) effects between an antecedent variable and its consequent variable. In this study, the antecedent variable was job design which was measured by individual job characteristics. The consequent variable was stress. It was hypothesized that role ambiguity and conflict mediate the relationships between job characteristics and stress.

Hierarchical multiple regression was employed to test the mediating effects of role ambiguity and conflict. Three regression steps were used to predict stress: 1) using job characteristics as predictors; 2) using role stressors as predictors; and 3) using both job characteristics and role stressors as predictors. The predictive powers of job characteristics and role stressors were determined by calculating the significance levels of differences in $R^2$. This technique was adopted from the mediation tests of the psychological states of the job characteristics model (JCM). Wall et al. (1978) described a set of rigorous criteria for the test of mediation of JCM: (a) the proposed mediators should account for sizable proportions of variance in the outcome variable(s); (b) the predictor variables should add little to this when considered in the same analysis; (c) the predictor variables alone should account for relatively little of the outcome variable(s); and (d) the mediators should add considerably to this when considered in the same analysis.

For the curvilinear relationships of identity-felt stress, identity-exhaustion, and significance-exhaustion, the tests of the mediation were based on control of curvilinearity. In these cases, three regression steps were used to predict stress: 1) using the squared term of job characteristic and job characteristic as predictors; 2) using role stressor as predictor; and 3) using the squared term of job characteristic, job characteristic, and role stressor as predictors. F statistics were calculated to test the levels of differences in $R^2$. The same criteria, developed by Wall et al. (1978), were used to determine the mediating effects of role ambiguity and conflict.

### 4.5.1. Role Ambiguity as A Mediator

**Summary of Results**

Table 21 shows the tests of the mediating effects of role ambiguity. As noted, the tests involving the relationships of identity-felt stress, identity-exhaustion, and significance-exhaustion were conducted separately

because of their curvilinearity. Therefore, they are not included in this table.

There was good evidence that role ambiguity mediated the relationships between job characteristics and stress. Using causal language, role ambiguity significantly predicted all stress variables. Job characteristics added little when they joined the same analysis, and alone they accounted for relatively little of the stress variables. Role ambiguity added significantly to this when considered in the same analysis. The strongest evidence of mediation was provided by anxiety and time stress. The weakest evidence was provided by felt stress, on which variety, significance, autonomy, feedback, and responsibility had a direct impact. Exhaustion was also directly associated with variety and autonomy.

Table 22 presents the tests of the mediating effects of role ambiguity on the relationships of identity-felt stress, identity-exhaustion, and significance-exhaustion. Felt stress and exhaustion were directly associated with identity and significance.

### 4.5.2. Role Conflict as A Mediator

**Summary of Results**

Table 23 shows the tests of the mediating effects of role conflict on the relationships between job characteristics and stress. The tests involving identity-felt stress, identity-exhaustion, and significance-exhaustion relationships are not included in Table 23.

The results are quite similar to those obtained from the tests of role ambiguity. Role conflict significantly predicted all stress variables. It mediated the relationships between job characteristics and stress. Job characteristics added little when considered in the same analysis, and alone accounted for relatively little in the predictions of stress. Role conflict added considerably to this when considered in the same analysis. The strongest evidence occurred for anxiety and time

stress. The weakest evidence was provided by felt stress, on which variety, significance, autonomy, feedback, and responsibility had a direct impact. Exhaustion was also directly related to variety, autonomy, feedback, and PDM.

Table 24 presents the testing of the mediating effects of role conflict on the relationships of identity-felt stress, identity-exhaustion, and significance-exhaustion. The results indicated that felt stress and exhaustion were directly associated with identity and significance.

## Conclusion

To summarize the tests of mediation, relatively strong evidence in support of Hypotheses 7 and 8 has been found, though the correspondence of job characteristics-role stressors-stress was not exactly that outlined in the hypotheses. The findings obtained from testing Hypotheses 7 and 8 had the following characteristics:

1. Role ambiguity and role conflict had significantly positive associations with <u>all</u> stress variables, whereas, the relationships between job characteristics and stress were characterized by a variety of forms such as positive, negative, and curvilinear. Therefore, role ambiguity and conflict appeared to be stronger predictors of stress than job characteristics.
2. Role ambiguity and conflict mediated the relationships between job design and stress. Using causal language, job design influenced stress through the mediating effects of role ambiguity and conflict.
3. Stress variables responded differently to the mediating effects of role ambiguity and conflict. In general, job characteristics added very little predictive power when they joined role stressors to predict anxiety and time stress. However, they may add significantly when joining role stressors to predict felt stress and exhaustion.

# Chapter Five

## Discussion

During the last two decades, job stress has been a key concept for both academic research and management practice. From the job holder's perspective, job stress is associated with perceived quality of working life (Baba & Jamal, 1991), and has been related to a number of physical and mental ailments (Ganster & Schaubroeck, 1991). From the organization's perspective, job stress is a factor which potentially hinders organizational effectiveness by contributing to lower employee performance (Jamal, 1985 a) and employee withdrawal behaviour, such as absenteeism, tardiness, and turnover (Spector & Jex, 1991). Ivancevich and Matteson (1980) estimated that stress costs the U.S. economy $50-90 billion annually, which accounted for 10% of GNP at the time their estimation was made.

The general notion that prolonged exposure to job stressors can result in stress has received widespread acceptance. However, close investigation of various causes of job stress is still sparse. Schuler (1980 a) pointed out that the lack of agreement about what constitutes stress and about what definitions and measures should be used in stress research have hindered the development of the field. More than ten years have passed since Schuler's statement, and the same problems are addressed once more (Ivancevich et al., 1990).

As we enter the 1990s, job stress researchers are faced with two important tasks: to further explore what causes job stress and to develop and modify the methodology used in this field.

This study was designed in response to these two concerns. It attempted to examine what constitutes stress and what should be done in stress research. The discussion of this thesis is divided into two sections. Section 5.1. is a discussion from the theoretical perspective. Section 5.2. is a discussion from a methodological perspective.

## 5.1. Discussion from the Theoretical Perspective

Four research issues have been addressed:

1. Linear and curvilinear relationships between job characteristics and job stress.
2. P-E fit/misfit and job stress.
3. Interactive effects of job content and context on stress.
4. Mediating effects of role stressors.

The theoretical discussions are presented according to the sequence of the four research issues.

### 5.1.1. Curvilinear and Linear Relationships Between Job Characteristics and Stress

To summarize the research relating job design to stress, two contradictory views have remained. One view has focused attention on work as a source of stressful demand or pressure (Ivancevich et al., 1990). Another view has regarded work as a process in which significance and personal identity are established (Spector & Jex, 1991). This study incorporated both views in the tests of the curvilinear relationship between job characteristics and job stress. It hypothesized that certain job components may be motivating as well as stressful. Whether or not the job components are stressful depends on the "fit" between the person and these job components.

The test of curvilinearity adopted Warr's notion of CE factors and AD factors (1985). CE factors refer to the job characteristics which have a linear relationship with stress, while the AD factors refer to the job characteristics which have a curvilinear relationship with stress. A certain level of AD factors is necessary to make one's working life meaningful and motivating. However, if the level goes beyond that optimum point, incremental AD factors may cause stress.

This study proposed responsibility and task significance as AD factors and autonomy as a CE factor. The rationale of these propositions was described in Chapter Two. The actual tests found a curvilinear relationship between task significance and exhaustion, but, the curvilinear relationship between responsibility and stress was not significant.

Further tests detected five curvilinear relationships. They occurred in the relationships of identity-felt stress, identity-exhaustion, incumbent-reported job complexity-exhaustion, DOT job complexity-exhaustion, and OP-exhaustion. These findings had four characteristics.

First, in consistency with the prediction of Hypothesis 2, all identified curvilinear relationships were U-shaped (Figure 2). That is, both low and high job complexity were associated with stress. It should be noted that the underlying reasons for the stressfulness may differ between the low and high complexity groups. For the low complexity group, stress may arise due to a lack of meaningfulness at work. For the high complexity group, stress may arise because of lack of ability, experience, and time to handle a complex job. It may also arise due to fear of failure which may have a significant influence on others. One thing is clear: job complexity can be motivating as well as stressful. Researchers in the past have been overwhelmed by the motivating features of job complexity and have overlooked the negative effects of job complexity. This study has called attention to both positive and negative effects of job complexity.

Second, all the curvilinear relationships were not symmetric (Figure 2). Individuals whose jobs had the lowest complexity experienced the highest stress, those whose jobs had an intermediate level of complexity experienced the lowest stress, and those whose jobs had the highest complexity experienced an intermediate level of stress. These findings

indicated that although both low and high job complexity were related to stress, the stress levels of those who had complex jobs were not nearly as high as those with low-complexity jobs.

The finding of unequal levels of stress in the low and high job complexity groups may have practical meanings for managers. It suggested that job complexity can be used as a means of reducing stress. However, managers need to know the extent to which a given job design leads to an optimum level of motivation for the job holder. A proper job design should provide the job holder with opportunity for personal development, and be sensitive, at the same time, to individual vulnerability.

Third, the curvilinearity occurred not only in job characteristics-stress relationships but also in job complexity-stress relationships. While Warr emphasized individual job characteristics in his discussion of AD factors, this study has added to our knowledge of AD factors by identifying job complexity as an AD factor as well. It should be emphasized that the empirical evidence to the curvilinear relationships between job complexity and stress was provided by all three measures of job complexity: incumbent-reported job complexity, DOT measure of job complexity, and OP.

The discovery of the curvilinear linkage between job complexity and stress is important. It indicated that although most job characteristics (CE factors) have a linear, negative relationship with stress, the combination of numerous CE factors can have a curvilinear relationship with stress. In other words, the accumulation of numerous job characteristics may change the nature of their effects. Further examinations of AD factors should focus not only on the individual characteristics but also on the additive and interactive effects of numerous characteristics.

Fourth, the curvilinear effects of job characteristics (or complexity) have centred on exhaustion, with the exception of the curvilinear relationship between task identity and felt stress. Since exhaustion indicates an extreme state of stress, and is related to numerous physical and mental ailments (Jackson et al., 1986; Maslach, 1982), the negative effects of job complexity on job holders' physical and mental health require serious consideration.

### 5.1.2. P-E Fit/Misfit and Stress

The P-E fit approach to job stress characterizes job stress as a result of a lack of fit between personal characteristics (e.g., abilities, values) and environment (e.g., demands, supplies). French and his colleagues distinguished S-V fit and D-A fit (Caplan et al., 1975; French et al., 1982; French & Kahn, 1962). Despite this, P-E fit notion has been used as a loose framework rather than as a rigorous model in most job stress research. "A major problem is the lack of corresponding schemes by which fit has been tested." (Venkatraman, 1989, p423). Another major problem has been the common negligence of the conceptual and empirical distinctiveness between S-V fit and D-A fit (Edwards & Cooper, 1990). Moreover, as was pointed out by Ganster and Schaubroeck (1991), researchers have often used inappropriately small sets of job dimensions and improper measures to test S-V fit and D-A fit. The absence of correspondence between the P-E fit theory and rigorous tests has weakened the influence of this theory in job stress literature.

In responding to the problems addressed above, this study was designed to test the P-E fit theory as rigorously as possible. The tests of P-E fit were characterized by three features:

1. This study tested S-V fit and D-A fit separately. The uniqueness of these two versions of P-E fit, with regard to their directions of moderator effects and their consequences, has been explored.
2. Seven job dimension and three summary measures of job complexity were employed as predictors in the tests of P-E fit. This is one of the few studies which employed a comprehensive set of predictors (the study of Caplan et al (1975) measured eight dimensions). Moreover, four stress variables were employed as the outcome variables. A broad coverage of the job dimensions and stress dimensions enables us to conduct a thorough test of P-E fit and stress.
3. Most studies of P-E fit have totally relied on subjective reports as the basis for measuring fit (Ganster & Schaubroeck, 1991). This study has attempted to reduce this reliance by using multiple measures of fit. D-A fit was measured by three variables: education, tenure, and D-A match. However, the measures of S-V fit had to rely on the subjective reports. Growth need strength (GNS) and a self-assessment of S-V match were used.

For the tests of S-V fit, although both GNS and S-V match were proven to have moderator effects on the relationships between job design and stress, the percentage of significant moderator effects of the total tests was relatively low. Nevertheless, the direction of the moderator effects of S-V match was consistent with the prediction (Figures 5 and 6). For instance, responsibility combining a lack of S-V match was associated with stress, whereas responsibility was not a stressor for those who perceived S-V match.

Surprising findings were obtained in the tests of GNS. It seemed that the relationship between job characteristics and stress was negative for individuals with lower GNS, whereas the relationship was positive for those with higher GNS.

GNS has not been tested as a typical moderator in stress research. Previous research on job design suggested that individuals with higher GNS responded more positively to job complexity than those with lower GNS (Loher et al., 1985; Fried & Ferris, 1987; Spector, 1985). Champoux (1992) suggested that the high GNS group should perceive job complexity as an opportunity and the low GNS group should perceive job complexity as excessively demanding. Following this logic, this study hypothesized that the negative relationship between job complexity and stress should be stronger for individuals with higher GNS than for those with lower GNS. Apparently, the empirical tests revealed an opposite moderator effect.

This unique finding has brought two insights. First, serious consideration should be given to differentiate job stress research from that of satisfaction and motivation. GNS may play different moderator roles when different outcome variables are considered. While GNS might have strengthened the positive relationship between job complexity and satisfaction and motivation, it may also strengthen the relationship between job complexity and stress. Given the fact that a complex job may contain motivating features and stress potential simultaneously, the different moderator effects of GNS should be expected as well.

Second, the comprehensiveness and appropriateness of the existing measures of personal value call for further examination. For instance, GNS has been considered as a continuing stream measuring the strength of growth need. Whether or not GNS may map other typology of personal value has not been investigated. We may understand the meanings of high GNS to a certain extent, however, we have not reached the same level of understanding of the meanings of low GNS. In other words, if one rated low on GNS, it is difficult to identify what would be the other need(s) that may motivate him or her, and what effects the unspecified need(s) may have on the relationships between job design and stress. The absence of knowledge of the true meaning of low GNS was reflected in Loher et al.'s meta-analysis (1985). In their study, the correlation between job

characteristics and satisfaction was .68 for those who were high on GNS and was .38 for those who were low on GNS. For the high GNS group, the variance in the correlations was essentially eliminated after controlling sampling and measurement errors. For the low GNS group, however, the variance in correlations was still large after controlling the same factors. "Apparently, factors that do not affect the relationship between job characteristics and job satisfaction for persons with high growth need strength do come into play for persons who are low on growth need strength (Loher et al., 1985, p287). Hence, Loher et al. suggested examining the factors influencing the low GNS groups. Unfortunately, this suggestion has not yet attracted much empirical attention. There has been a general tendency to pay more attention to the high GNS group than to the low GNS group, because the high GNS group has been the focal group in the research on satisfaction and motivation.

This study found that the relationship between job characteristics and stress was negative for the low GNS group. Unfortunately, it failed to provide an adequate explanation to this finding due to the lack of knowledge about the low GNS group. Thus, this study suggested giving attention to the low GNS group. One rated low on GNS may by motivated by other factors, and the unspecified factors may play important roles in influencing the relationship between job design and stress.

Personal value is an extremely complex construct. It varies greatly among people and seldom has any definable "boundary". Therefore, it is very difficult to verify the construct validity of measures of value. Further research is needed to examine two issues: (a) What value dimensions are assessed by the existing measures of personal value such as GNS? If they are multi-dimensional, what are the effects of these value dimensions on stressor-stress relationships? and (b) Whether or not the existing measures of personal value have conceptualized and assessed values effectively or sufficiently. If not, new measures should be developed in order to facilitate the tests of S-V fit.

For the tests of D-A fit, three variables were employed: education, tenure, and D-A match. The first two were suggested by Schuler (1977 a) as appropriate indicators of ability. The reason for incorporating D-A match into this study was to add a self-assessment of D-A fit/misfit.

The empirical tests detected three moderator effects of education and two effects of tenure. Dunlap and Kemery (1988) suggested that the lower the correlations between the predictor and the moderator, the less likely the interaction term was to be significant. In this study, education was positively related to skill variety, autonomy, responsibility, and PDM, it was not related to other characteristics. Tenure was positively related to variety, autonomy, responsibility, and PDM, it was not related to the others. The correlations between education/tenure and job characteristics varied from .11 to .30. This may partially explain the reasons for the lack of significant findings. Further, the sample of this study is not ideally suited to examine the relationships involving tenure. As was suggested by Johns et al. (1992, p28 of the manuscript), "The most interesting and informative sample for studying the interaction between job tenure and job design might sensibly include jobs 1) of a similar occupational level 2) with a substantial learning curve 3) that exhibit adequate variance in core job characteristics." Only the last characteristic describes the current sample precisely.

Despite the low percentage of significant findings, the direction of all the moderator effects of education and tenure was supportive to the hypothesis (Figures 7, 8, and 9). For instance, The identity-exhaustion relationship was U-shaped for the high education group, whereas, it was nearly a positive, linear one for those with a lower education. This suggested that the identified curvilinear relationship between identity and exhaustion (Figure 2) was mainly constituted by individuals with a higher education (the mean of education of the present sample was 15 years). For those with lower education, increased task identity was

associated with increased exhaustion.

The variable which provided the strongest support to the hypothesized relationship between D-A fit and stress was D-A match. D-A match moderated many relationships between job design and stress (Figures 10 and 11). The direction of these effects was exactly as outlined in the hypothesis.

To summarize the tests of D-A fit, the moderator effects of education, tenure, and D-A match were consistent with Hypothesis 5. That is, dealing with complex jobs, those with a higher education, a longer tenure, and perceived D-A match experienced much lower stress than those with a lower education, shorter tenure, and a lack of D-A match.

Overall, the tests of P-E fit/misfit have led to the following insights:

First, S-V fit and D-A fit represent two important aspects of P-E fit. S-V fit involves a process in which the job holder uses his or her personal values to cognitively evaluate the working environment. D-A fit is a process in which the job holder uses his or her abilities to meet the job demands of the environment. Although S-V fit and D-A fit are related to each other (e.g., one might have to meet job demands in order to reach the desired value state), they are not replaceable with one another. P-E fit research should incorporate both versions.

Second, P-E fit research should differentiate between the test of S-V fit and the test of D-A fit. On one hand, S-V fit/misfit is more abstract and/or intangible than D-A fit/misfit. Hence, the moderator effects of S-V fit are more complex than those of D-A fit. Moreover, the test of D-A fit can incorporate alternative sources of data (such as that in the study of Coburn, 1975), whereas, the test of S-V fit has to depend mainly on subjective assessments. On the other hand, S-V fit and D-A fit differ on the associated variables. Previous research suggested that the major differences, between S-V fit and D-A fit, are that S-V fit is

unlikely to be related to performance while D-A fit is likely to be related to performance (Edwards & Cooper, 1990). This study has brought attention to their differences in interaction with job design variables. It was found that the moderator effects of S-V fit have occurred on the relationships of job characteristics and stress. GNS and S-V match did not moderate any relationship between job complexity and stress (Figure 12), whereas most moderator effects of D-A fit (eight out of thirteen) have centred on the complexity-stress linkages (Figure 13).

Third, P-E fit research has focused on the moderator effects of P-E fit on the relationships between stressors and stress. The main effects of P-E fit/misfit have been less investigated. This study found that S-V match and D-A match were negatively related to most of the stress variables (Table 3). Those who perceived S-V mismatch and/or D-A mismatch consistently reported a higher level of stress than those who perceived S-V match and/or D-A match (Figures 5, 6, 9, and 10). These findings have called attention to examine the main effects of S-V fit and D-A fit.

### 5.1.3. Interactive Effects of Job Content and Job Context on Stress

This study hypothesized that job stress results not only from the misfit between personal characteristics and environment, but also from the misfit between environmental factors (E-E fit/misfit).

Though the notion of E-E fit was proposed in this study, the interactive effects of job characteristics on stress have been examined in the past. For instance, the joint effects of attentional demands and responsibility on stress have been systematically investigated (Cobb & Rose, 1973; Martin and Wall, 1989; Warr, 1987). Further, the interactive effects of job scope and context on affective outcomes have been examined recently (Champoux, 1992).

The uniqueness of this study was that it focused on the interactive effects of job complexity and context on stress. It hypothesized that the combination of low job complexity and unsatisfactory context will create a higher level of stress than other combinations of job complexity and context. The empirical tests have provided modest support to the hypothesis.

Job context moderated the relationship between job complexity and stress. The combination of low complexity and unsatisfactory context was associated with the highest level of stress (Figures 14 and 16). Hackman and Oldham (1976) suggested that job context factors facilitate the positive effects of job complexity on psychological states and the impact of the state on outcomes. This study provided support for the moderating effects of job context.

Further examination of the interaction revealed interesting phenomena. In most cases, the lowest stress occurred for the combinations of low complexity and satisfactory context (Figures 14, 16, and 17). With the presence of poor job context, job complexity was stressful. With the presence of good job context, low job complexity was not related to the highest stress. Therefore, to solely increase job complexity may not be an ideal nor even an effective means to reduce stress.

Moreover, the interactive effects of job complexity and perceived fairness received stronger support than that of job complexity and working conditions. Five interactive effects were detected from the relationships of complexity-perceived fairness. They accounted for approximately 42% of the total tests conducted. Two interactions were detected from the relationships of complexity-working conditions, they accounted for only 8.3% of the tests conducted. It is possible that undesirable physical working conditions may not have been a serious problem in Canada. It might also be due to measurement problems. Two measures were used to measure working conditions, one was developed in this study which does not have established psychometric property and the other was severely skewed.

Another interesting finding is that job context had much stronger main effects on stress than job complexity. The two contextual factors, working conditions and perceived fairness, had significant relationships with all stress variables, whereas incumbent-reported job complexity was positively related to felt stress and negatively related to exhaustion and anxiety. It was not related to time stress. The two nonincumbent measures of job complexity had a negative relationship with exhaustion and had no relationship with the other stress variables. When job complexity and context were used to predict stress, context appeared to have much stronger and more consistent main effects than complexity (Tables 15, 16, 18, and 19).

Two inter-related factors may have determined the differences in the main effects of complexity and context. One factor involved the components of job complexity. As noted, the relationships between job characteristics and stress are characterized by a variety of forms such as positive, negative, and curvilinear, hence, the relationships between job complexity and stress were diluted because of the different effects of the components of job complexity. The other factor is that individual preferences may differ more substantially on job complexity than on job context. Returning to the findings of S-V fit and D-A fit, one's preferences on complexity are not only driven by personal values but also constrained by abilities. In other words, job complexity may fulfil important job values, while creating unbearable demands for existing abilities. Overall, the relationship between the job holder and job complexity is one of giving and receiving. The job holder must satisfy job demands (by giving abilities) in order to achieve valued states (receiving environmental supplies). However, the relationship between job holder and job context is much simpler. On one hand, most people prefer pleasant working conditions and being treated fairly, thus, value differentiations are minimized concerning these factors. On the other hand, ability is not a necessity for exchange of job context. Therefore,

the relationship between job context and stress is unlikely to be moderated by S-V fit and D-A fit.

Many theorists and researchers have argued that one way to decrease employees' stress is to increase job complexity. This study found that job context had main effects as well as interactive effects with complexity on stress. These findings highlighted a potential source of stress which has been relatively neglected in job stress literature.

Turning to the managerial implications of the findings, the improvement of job context can be used as a common and "safe" strategy to compensate job content and to reduce stress. Where low job complexity is unavoidable, undesirable context should be minimized either through improvement of working conditions or by providing fair compensation. Correspondingly, where high job complexity is required, compatible context should be combined in order to support the complicated job being performed. Considering that job context is mainly controlled at the organizational level, and is less influenced by macro factors such as technological elements and linkage with other functions and/or jobs, the improvement of job context should be easier than that of job content. It should be emphasized that job complexity may not necessarily have the same function to compensate poor context. The relationship between job complexity and stress is a product of a combination of individual values, preferences, abilities, and social influences. Job complexity may be viewed favourably by some employees, while others may be indifferent or, even find it stressful. Hence, the occurrence of E-E fit/misfit may vary greatly among individuals according to the circumstances.

This study proposed the notion of E-E fit in a rather narrow sense. The combination of low complexity and poor context was addressed as a typical case of E-E misfit. As a matter of fact, E-E fit/misfit should be viewed from a broader perspective. Different combinations of E-E misfit may be dependent on the individual job holder's perception. For instance, jobs with high complexity are generally associated with better context

than jobs with low complexity. In this regard, the combination of high complexity and poor context may be perceived as a misfit. The findings of this study seem to indicate this tendency (Figures 14 to 17). Therefore, whether or not a certain combination is a fit or misfit is determined largely by the societal context and by individual preferences. The attempt of defining a universally "ideal" job design is neither desirable nor possible.

### 5.1.4. Mediating Effects of Role Stressors

The job design/stress literature has been heavily influenced by role stress theory. Role ambiguity and role conflict have remained the dominating factors in this field. Questions are raised about the appropriateness of the reliance on the role stress constructs. From a theoretical perspective, there is no established theory which assures the representativeness of role stressors to job stressor as a whole. From a methodological standpoint, an over-reliance on the measures of role ambiguity and role conflict may have created obstacles for the development and use of other measures, thus constraining the exploration of other causes of job stress.

This study attempted to probe the basic causal antecedents of stress. It emphasized the need for a shift in research attention away from the sole examination of role ambiguity and role conflict, toward an emphasis on the stressfulness of job characteristics. The belief that the study of job design/stress should be conducted based on fundamental units such as job characteristics is based on three reasons.

One, job characteristics have a higher level of generalizability than role ambiguity and conflict. Most measures of job characteristics were intentionally designed for heterogeneous samples. In contrast, role ambiguity and role conflict have unbalanced occurrences across occupations. To identify and describe the basic job characteristics which are associated with stress will enable researchers to better

understand the causes of job stress in various occupations.

Two, the validity of job design variables are testable due to the existence of alternative sources of measures. However, it is more difficult to test the validity of role ambiguity and conflict. If researchers use role ambiguity and conflict as the sole measures of job stressors, they will likely be faced with the challenge of detecting and controlling common method variance.

Three, eighty-five percent (85%) of the job stress research prior to 1985 had employed role ambiguity and role conflict (Jackson & Schuler, 1985). The reliance on these two measures has not changed since 1985. The research relating other sources of stressor and stress has been limited. Even if role ambiguity and role conflict have established psychometric properties, a research area should not be confined by two constructs. In particular, since the theoretical development of job design/stress research is at a preliminary stage, research should be conducted based on more basic qualities of job design such as job characteristics in order to explore the potential sources and outcomes of job stress. Multiple approaches should be adopted in order to broaden the research base in this area.

Salancik and Pfeffer (1978) introduced the social information processing model (SIP) as an alternative view of job design, which suggested that task perceptions and affective responses are functions of social cues. The major difference, between the job characteristics model (JCM) and the SIP model, is that the JCM assumes that employees perceive and react to an objective workplace reality whereas the SIP model suggests that the workplace realities are at least partially constructed from information provided by the social context.

Salancik and Pfeffer's opinion of cognitive influences was well taken. However, this study emphasized the basic components of a job rather than on the social cues surrounding the job. There were two rationales for this choice. On one hand, social information is a process

in which individuals develop their own perceptions of their jobs. This study emphasized the perceptions rather than the process. On the other hand, the basic components of job design can be used to describe all jobs. It can be measured by incumbent reports as well as nonincumbent measures. Previous research indicated that the self-reported data of job characteristics are relatively clean in comparison to those of other constructs of organizational behaviour (Wagner & Crampton, 1990). This study found good evidence to support the congruency between job holders' perceptions of their jobs and expert observations of these jobs, while the effects of social information are more abstract and intangible. Research on SIP would have to use either experimental design or memory-based data. This might explain why there has been a lack of convincing evidence to the effects of social cues on perception of job design.

This study suggested role ambiguity and conflict as mediators in the relationship between job design and stress. The criteria developed by Wall et al. (1978) were used in the tests of mediation. Relatively strong evidence was found in support of the mediating effects of role ambiguity and role conflict. Although causality cannot be verified in this study due to the nature of a cross-sectional design, it was found that job characteristics are associated with role stressors, which in turn are related to anxiety, time stress, felt stress, and exhaustion. Further, it was found that role ambiguity and conflict do not mediate every relationship between job characteristics and stress. Certain job characteristics were directly associated with stress (e.g., the relationship between PDM and stress was not mediated by role stressors).

These findings are meaningful mainly for academic research. If more studies are conducted vis-a-vis both job design and role stressors, accumulated information can create a basis for conclusive analysis such as meta-analysis. This way, the linkage of job design-role stressors-stress will be verified.

## 5.2. Discussion from A Methodological Perspective

Methodologically, this study is characterized by four features:

1. It has used a heterogenous sample which covers a wide range of jobs.
2. It adopted a two-level analysis. It investigated the relationship between job characteristics and stress as well as the relationship between the summary measures of job design and stress.
3. It included four stress variables in pursuit of examining the dimensionality of job stress. The linkage between specific job characteristics and specific stress variables has been tested. The sensitivities of specific stress variables to various P-E fit and E-E fit have been explored.
4. It employed incumbent-reported measures and nonincumbent measures of job design. The nonincumbent measures were used, not only as a tool for detecting common method variance, but also as real measures in all statistical analysis.

### 5.2.1. Importance of Two-Level Analysis

Historically, job characteristics have been examined mainly as causal factors of satisfaction and motivation rather than potential stressors (Hackman & Oldham, 1976; Vroom, 1960). Therefore, job characteristics have often been aggregated as summary measures of job design. The generation of Motivational Potential Score (MPS, Hackman & Oldham, 1976) is a typical example of aggregation. When the ummary measures of job design were used, the uniqueness of individual job characteristics was largely neglected. While this may be appropriate for research on job satisfaction and motivation, it has not been made clear whether or not research on job stress should adopt the same approach.

More recent studies have examined the additive and interactive effects of job characteristics on stress. The general norm has been to incorporate a pair of job characteristics into the same analysis. Typical examples are the studies of the joint effects of job demand and job

decision latitude on stress (Karasek, 1979, Dwyer & Ganster, 1991). This type of research provided useful information about how job characteristics may interactively affect stress. Unfortunately, it cannot provide information about the comparative effects of numerous characteristics on job stress.

Kelloway and Barling (1991) included five job characteristics in their study of mental health. The specific paths among individual characteristics and outcome variables were identified. However, their study only focused on the effects of specific facets of job characteristics, and did not explore aggregated effects .

This study has differed from most studies in the past. It examined the relationships between seven job characteristics and stress as well as the relationships between three summary measures of job complexity and stress. On one hand, it explored the unique relationships among job dimensions and stress dimensions. On the other hand, it examined how aggregated measures of job design (job complexity) may contribute to stress.

The analysis of the relationships among job dimensions and stress dimensions has detected three patterns of relationships. The first was a classical pattern of a negative relationship. It was consistent with the general belief that job complexity decreases stress. In this study, this pattern was reflected by the variables anxiety and exhaustion. Anxiety was negatively associated with identity, autonomy, feedback, and PDM. Exhaustion was negatively related to all job characteristics except responsibility.

The second was a mixed pattern reflected by time stress. Only two out of seven job characteristics were associated with time stress. Feedback had a negative association with time stress whereas responsibility showed a positive one. Hence, the correlation between the summary measure of job complexity and time stress was not significant.

The third pattern, the most unusual one, was the positive association between variety, significance, responsibility, and felt stress. Two questions have been raised because of this association: 1) Why were these three dimensions associated with felt stress? 2) Why was the relationship positive? One possible explanation is that although all job characteristics constituted the level of job complexity, the weight of the "burden" for the job holders may differ. Returning to the discussion of AD factors discussed in Chapter 2 Section 2.3.1., different job characteristics may have different effects on the job holder's psychological state and mental health. Task significance had a U-shaped curvilinear relationship with exhaustion. Responsibility often combined D-A match or S-V match to cause stress (Figures 5 to 10). These characteristics had a higher propensity to cause felt stress than other characteristics such as feedback and PDM. This might occur because responsibility, skill variety, and task significance create job demands which require abilities, experiences, and skills from the job holder. It is also possible that variety, responsibility, and significance are comparatively uncontrollable for the job holder, in comparison to feedback, PDM, and autonomy. For instance, an air-traffic controller cannot change the level of responsibility and significance of his or her job. Further, he or she must have a variety of skills in order to perform the job. But, the job holder may be entitled to certain flexibility in choosing the extent to which he or she would like to participate in decision-making, to obtain feedback, and to use autonomy. These factors may be less likely to make people <u>feel</u> stressful than variety, responsibility, and significance.

The tests of P-E fit and stress (Hypotheses 4 and 5) were based on the two-level analysis. The results have shown different patterns of interactions of predictor and moderator. In the tests of S-V fit, only when job characteristics were considered, were the elegant relationships reflected by S-V fit detected (Figures 3 to 6). However, in the tests of D-A fit, most of the significant interactions occurred between job complexity and moderators (Figures 8, 10, and 11). In general, the summary measures of job complexity reported significant findings only if 1) the effects of numerous job characteristics which constituted the summary measures were the same and/or 2) the effects of one or two characteristics were overwhelmingly strong. In this study, the tests of D-A fit and stress have met the above conditions. Given the fact that moderator effects are generally difficult to discover (Stone, 1988), and job characteristics show different relationships with stress, the tests of interactive effects of job design and personal characteristics on stress should use the two-level analysis.

In this study, the decision regarding what level(s) the analysis should be conducted at was guided by two principles. The first principle was that the selection of methods should be driven by the research questions. The tests of interactions between job complexity and job context on stress (E-E fit) only employed the summary measures of job complexity, because job complexity was hypothesized as having interactive effects with job context. For similar reasons, individual job characteristics were employed in the tests of mediation effects of role ambiguity and conflict. The second principle was to maximize the use of the two-level analysis. As noted earlier, in a developing field like the relationship between job design and stress, it was felt that research should start from a fundamental level in order to "sense" the possibilities and to accumulate knowledge.

### 5.2.2. Dimensionality of Job Stress

This study has employed four stress variables: anxiety, time stress, felt stress, and exhaustion. These variables reacted differently to job characteristics. Anxiety and exhaustion consistently show a negative association with job characteristics. In addition, these two variables were much more sensitive to the interactive effects of job content and job context (Figures 14 to 17). Time stress was a unique variable which was negatively associated with feedback and positively associated with responsibility. It was not associated with other job characteristics. Moreover, time stress was a sensitive variable in the tests of P-E fit and stress. When the job holder's abilities could not match the job demands, time pressure may have emerged as the consequence.

The measures of anxiety and time stress were developed by Parker and DeCotiis (1983) as two distinct dimensions of stress. In their original design, the correlation between these two stress dimensions was .54. Parker and DeCotiis (1983) suggested that these two variables were considerably non-overlapping. This study provides empirical support for the dimensionality of these two variables by a factor analysis (Appendix 4). The items measuring time stress have not loaded in the same factor with those measuring anxiety. Moreover, significantly different results in the tests of moderation, mediation, interaction, correlations and curvilinearity have been reported by using these two stress variables. Job stress researchers often combined these two measures and treated them as an overall indicator of stress. It is hoped that in the future they may consider treating these two dimensions separately.

The most "abnormal" stress variable was felt stress. It was not only positively related to job characteristics, but also had the highest average response among the four stress variables: felt stress, mean=4.42; anxiety, mean=3.62; time stress, mean=3.20; exhaustion, mean=2.67. Since the four stress variables have exactly the same response scale, a repeated measure comparison was conducted to examine the statistical differences

between the average responses. The results indicated that the average response to felt stress was significantly higher than anxiety ($F=172.35$, $p<=.0001$). Anxiety was higher than time stress ($F=56.96$, $p<=.0001$), and time stress was higher than exhaustion ($F=103.23$, $p<=.0001$). Since exhaustion indicates extreme feelings of stressfulness, it is understandable why the average response to exhaustion was the lowest. However, it is difficult to identify the causes of the higher responses to felt stress. It is possible that the questions measuring felt stress, such as "My job is extremely stressful" are prone to over-reports. It is also possible that the participants truly felt stressed, while not necessarily suffering the same level of anxiety, time stress, and exhaustion. Two things are clear. One, the four stress variables are not identical constructs. Two, the variable felt stress should be used with caution. The high average response to this variable may have led to an insufficient range for some statistical tests. In this study, felt stress appeared to be insensitive to most tests of interaction.

Unlike the dimensionality of job design which has been extensively investigated, little is known about the dimensionality of job stress. This study provided some information regarding the similarities and uniqueness of the four stress variables. Their distinctiveness has called attention to the dimensionality of job stress. Until more precise dimensions of stress are identified and more comprehensive measures of stress are developed, future research is unlikely to generate integrated findings.

### 5.2.3. Incumbent-Reported Versus Nonincumbent Measures of Job Design

This study employed two nonincumbent measures of job design. They were the Dictionary of Occupational Titles (DOT, Roos & Treiman, 1980), and Occupational Prestige (OP, Treiman, 1977).

Three reasons for incorporating these nonincumbent measures into this study were discussed in Chapter Three:

1. It helped to detect the effects of measurement artifacts such as common method variance.
2. It examined the degree of "match" between incumbents' perceptions of their jobs and expert observations of these jobs.
3. It measured job characteristics from different perspectives.

The first reason proved to be useful, because the incumbent-reported and nonincumbent measures of job complexity and working conditions show a statistically significant degree of convergence and discriminability (Appendix 6). The third reason was also useful. As it was described in Chapter Three, the three measures of job design have assessed some similar job characteristics. Meanwhile, each measure mapped unique job characteristics.

How to examine the "match" between incumbent-reported and nonincumbent measures has been a challenging question due to the absence of a criterion. If we examine the match derived from the statistical results, both match and mismatch have been found. The match between the incumbent-reported and nonincumbent measures was reflected by the numerous similar findings in the tests of correlation, mediation, interaction, and curvilinearity. For instance, the joint effects of D-A match and incumbent-reported job characteristics were very similar to those reported by the nonincumbent measures of job complexity (Figures 8, 9, and 10). The joint effects of incumbent-reported complexity and context on stress were exactly the same as those reported by DOT measure of complexity and context (Figure 16). Considering that incumbent and nonincumbent measures were not designed to assess identical dimensions, they have demonstrated a substantial degree of match.

Nevertheless, dissimilarities have been observed from the results obtained by the multiple-source data. For instance, D-A match moderated the relationships of DOT complexity-stress and OP-stress. These effects

were not supported by the self-reported complexity. To view the tests of D-A match alone, non-incumbent measures of job complexity were better predictors than incumbent-reported job complexity (Figure 13).

The incumbent-reported job complexity seemed to be more sensitive in the tests of interactive effects of E-E fit than the nonincumbent measures (Figure 14 to 17), while the nonincumbent measures seemed to be more sensitive in the tests of D-A match (Figures 10 and 11). This is perhaps due to the fact that DOT was developed to provide the U.S. government with occupational information to be used in matching employees having particular abilities to suitable jobs. In contrast, incumbent job characteristics measures were derived from job design theories.

On the whole, the incumbent and nonincumbent data have supported each other considerably. It indicated a substantial degree of congruency between the job holders' perceptions of their jobs and the expert observations of these jobs.

In general, the incumbent-reported data is regarded as "subjective" data while the nonincumbent measures are regarded as "objective" data. In organizational behaviour research, there has been an increasing trend to emphasize the "objective" measures. Questions have remained about what criteria can be used to test the objectivity of the nonincumbent measures. Can we use different nonincumbent measures to support each other's objectivity? If so, this study provided the evidence, because DOT and OP reported very similar results. However, unless the nonincumbent measures are truly independent of each other, such a comparison is not appropriate.

The findings of this study call attention to the following:

1. The sources of measure should not be the only criterion for judging the objectivity/subjectivity of data. Although incumbent-reported measures are particularly vulnerable to criticism about common method variance, it should be recognized that the nonincumbent measures are not free from the same problem. As a matter of fact, the incumbent-reported data, derived from well-designed measures and

from appropriate samples, are not necessarily less objective than the nonincumbent data. If the nonincumbent measures are not well-designed and/or not truly independent of the incumbent-reported data, they may produce neither objective nor accurate results.

2. The choice of measure should be led by research questions. For topics such as job design, researchers should strive to incorporate multiple-source data. For topics focusing on individual perceptions and attitudes, self-report measures might be the only means for collecting data (such as the measures of S-V match in this study). Further, it should be noted that nonincumbent measures are generally aggregated indicators (such as job complexity). While they may be informative to certain constructs, they may not be sensitive to specific dimensions of the constructs.

3. For studies in which data is collected from a single source of incumbent reports, the degrees of common method variance may vary greatly across different designs. More research attention should be devoted to examining the extent to which common method variance may inflate specific findings and the strategies to solve this problem (Avolio, Yammarino, & Bass, 1991). It is not appropriate to negate the value of all studies which have relied on incumbent reports.

This study has found a relatively high level of agreement between the incumbent and nonincumbent measures. This does not suggest using one source of measure to replace the other. Incumbent and nonincumbent measures have their own uniqueness. In this study, the merit of the incumbent-reported measures is that these measures map the job holder's perceptions of <u>job characteristics</u>. The merit of the nonincumbent measures is that they were developed based on an average level of occupation, thus providing a basis for establishing norms. While the incumbent and nonincumbent measures may complement each other, neither one can replace the other.

This study is not totally free from the inflation of common method variance. Although a tremendous amount of effort has been devoted to detect this problem within the predictor variables and within the outcome variables, the connection of the predictors and outcomes was still vulnerable to common method variance. Due to the lack of an alternative source of stress measure, the interpretation of findings has to be restricted to perceptions of stress. The extent to which the perceptions of stress are related to other stress reactions remains unknown. This study suggested that much more research is needed, not only for conceptual exploration of the relationship between job design and stress, but also for developing tools for empirical testing.

Table 1.

Means, Standard Deviations, Ranges, Medians and Reliability Coefficients of Major Variables

| | # OF ITEMS | RANGE | MEAN | S.D. | MEDIAN | ALPHA |
|---|---|---|---|---|---|---|
| **Job design variables** | | | | | | |
| Variety | 3 | 1-7 | 4.81 | 1.60 | 5.00 | .76 |
| Identity | 3 | 1-7 | 5.25 | 1.41 | 5.67 | .67 |
| Significance | 3 | 1-7 | 5.22 | 1.31 | 5.33 | .64 |
| Autonomy | 3 | 1-7 | 5.39 | 1.37 | 5.67 | .74 |
| Feedback | 3 | 1-7 | 5.17 | 1.33 | 5.33 | .72 |
| Responsibility | 6 | 1-5 | 2.65 | 0.98 | 2.67 | .82 |
| PDM | 4 | 1-5 | 3.42 | 0.83 | 3.50 | .78 |
| Complexity | 25 | | 4.25 | 0.82 | 4.32 | .89 |
| Conditions | 13 | 1-5 | 2.33 | 0.58 | 2.31 | .73 |
| Complexity (DOT) | 1 | 0-10 | 5.56 | 2.03 | 6.00 | N.A. |
| Skills (DOT) | 1 | 0-10 | 4.74 | 2.03 | 4.20 | N.A. |
| Demand (DOT) | 1 | 0-10 | 0.71 | 1.25 | 0.25 | N.A. |
| Conditions (DOT) | 1 | 0-10 | 0.13 | 0.60 | 0.00 | N.A. |
| Occupational prestige | 1 | 14-86 | 48.70 | 13.73 | 51.00 | N.A. |
| **Moderating variables** | | | | | | |
| GNS | 12 | 1-7 | 4.36 | 0.87 | 4.42 | .71 |
| Fairness | 6 | 1-5 | 3.22 | 0.92 | 3.17 | .92 |
| D-A match | 5 | 1-7 | 5.38 | 1.07 | 5.60 | .73 |
| S-V match | 3 | 1-7 | 4.30 | 1.68 | 4.33 | .81 |
| Education | 1 | 1-23 | 15.28 | 2.88 | 15.00 | N.A. |
| Tenure 1 | 1 | 0.1-45 | 4.42 | 5.32 | 2.60 | N.A. |
| Tenure 2 | 1 | 1-48 | 8.14 | 8.46 | 5.00 | N.A. |
| **Mediating variables** | | | | | | |
| RA | 6 | 1-7 | 2.63 | 0.97 | 2.50 | .73 |
| RC | 8 | 1-7 | 3.63 | 1.13 | 3.63 | .76 |
| **Job stress variables** | | | | | | |
| Anxiety | 4 | 1-7 | 3.62 | 1.52 | 3.50 | .76 |
| Time stress | 8 | 1-7 | 3.20 | 1.27 | 3.00 | .82 |
| Felt stress | 3 | 1-7 | 4.42 | 1.49 | 4.33 | .74 |
| Exhaustion | 9 | 1-7 | 2.67 | 1.17 | 2.33 | .89 |

Note: N = 418; PDM = Participation in decision making; DOT = Dictionary of occupational title, GNS = Growth need strength; D-A match = Demand/ability match; S-V match = Supplies/value match; Tenure 1 = Years of working experience on current job; Tenure 2 = years of working experience on the same line of job; RA = Role ambiguity; RC = Role conflict.

Table 2.

Correlation Matrix of Incumbent, DOT, and Occupational Prestige Measures of Job Characteristics

| Source/Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Incumbents: | | | | | | | | | | | | | |
| 1. Variety | 76 | | | | | | | | | | | | |
| 2. Identity | 29 | 67 | | | | | | | | | | | |
| 3. Significance | 43 | 24 | 64 | | | | | | | | | | |
| 4. Autonomy | 55 | 40 | 29 | 74 | | | | | | | | | |
| 5. Feedback | 32 | 26 | 32 | 37 | 72 | | | | | | | | |
| 6. Responsibility | 49 | 26 | 29 | 46 | 22 | 82 | | | | | | | |
| 7. PDM | 48 | 32 | 25 | 54 | 41 | 59 | 78 | | | | | | |
| 8. Complexity | 76 | 57 | 58 | 75 | 58 | 73 | 74 | 89 | | | | | |
| 9. Conditions | -17 | -17 | 01 | -18 | -15 | 06 | -22 | -20 | 73 | | | | |
| DOT: | | | | | | | | | | | | | |
| 10. Complexity | 52 | 21 | 12 | 31 | 17 | 42 | 37 | 46 | -27 | | | | |
| 11. Skills | -02 | -14 | -06 | -15 | -09 | -25 | -20 | -19 | 12 | -02 | | | |
| 12. Demands | -08 | -04 | -02 | -09 | -02 | -06 | -14 | -08 | 19 | -23 | 12 | | |
| 13. Conditions | -21 | -06 | -07 | -18 | -08 | -11 | -16 | -18 | 11 | -34 | 10 | 40 | |
| OP: | | | | | | | | | | | | | |
| 14. OP Score | 49 | 17 | 13 | 27 | 13 | 39 | 34 | 42 | -17 | 83 | 05 | -26 | -30 |

Note: $N$ = 418; PDM = Participation in decision-making; Incumbent-reported job complexity = mean of all job characteristics (variable 1 through variable 7); DOT = Dictionary of Occupational Title; OP = Occupational Prestige. Decimals omitted from correlations and reliabilities; Reliabilities (coefficient alpha) on diagonal; $r = .10$, $p < .05$; $r = .13$, $p < .01$.

Table 3.

Correlation Matrix of Major Variables

| | M | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Job Design Variables: | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Variety | 4.81 | 1.60 | 76 | | | | | | | | | | | | | | | | | | | | | |
| 2. Identity | 5.25 | 1.41 | 29 | 67 | | | | | | | | | | | | | | | | | | | | |
| 3. Significance | 5.22 | 1.31 | 43 | 24 | 64 | | | | | | | | | | | | | | | | | | | |
| 4. Autonomy | 5.39 | 1.37 | 55 | 40 | 29 | 74 | | | | | | | | | | | | | | | | | | |
| 5. Feedback | 5.17 | 1.33 | 32 | 26 | 32 | 37 | 72 | | | | | | | | | | | | | | | | | |
| 6. Responsibility | 2.65 | .98 | 49 | 26 | 29 | 46 | 22 | 82 | | | | | | | | | | | | | | | | |
| 7. PDM | 3.42 | .83 | 48 | 32 | 25 | 54 | 41 | 59 | 78 | | | | | | | | | | | | | | | |
| 8. Complexity | 4.25 | .82 | 76 | 57 | 58 | 75 | 58 | 73 | 74 | 89 | | | | | | | | | | | | | | |
| 9. Conditions | 2.33 | .58 | -17 | -17 | 01 | -18 | -15 | 06 | -22 | -20 | 73 | | | | | | | | | | | | | |
| 10. Complexity (DOT) | 5.56 | 2.63 | 52 | 21 | 12 | 31 | 17 | 42 | 37 | 46 | -27 | (N.A) | | | | | | | | | | | | |
| 11. Conditions (DOT) | .13 | .60 | -21 | -06 | -08 | -18 | -08 | -11 | -16 | -19 | 11 | -34 | (N.A) | | | | | | | | | | | |
| 12. OP | 48.70 | 13.73 | 49 | 17 | 12 | 27 | 13 | 39 | 34 | 42 | -17 | 83 | -30 | (N.A) | | | | | | | | | | |
| Moderators: | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. GNS | 4.36 | .87 | 26 | 19 | 06 | 26 | 17 | 23 | 22 | 27 | -08 | 22 | -13 | 18 | 71 | | | | | | | | | |
| 14. Fairness | 3.22 | .92 | 24 | 22 | 29 | 32 | 37 | 25 | 41 | 43 | -40 | 20 | -17 | 10 | 10 | 92 | | | | | | | | |
| 15. D-A match | 5.38 | 1.07 | 54 | 27 | 34 | 43 | 37 | 34 | 36 | 56 | -17 | 34 | -11 | 37 | 08 | 33 | 73 | | | | | | | |
| 16. S-V match | 4.30 | 1.68 | 58 | 24 | 38 | 40 | 34 | 34 | 38 | 56 | -26 | 39 | -14 | 33 | 15 | 41 | 65 | 81 | | | | | | |
| Mediators: | | | | | | | | | | | | | | | | | | | | | | | | |
| 17. Role ambiguity | 2.63 | .97 | -11 | -25 | -23 | -26 | -46 | -16 | -28 | -36 | 16 | -01 | 08 | -06 | -04 | -39 | -39 | -26 | 73 | | | | | |
| 18. Role conflict | 3.63 | 1.13 | -01 | -22 | -04 | -12 | -29 | 12 | -07 | -09 | 24 | -01 | 01 | -02 | -03 | -29 | -17 | -16 | 39 | 76 | | | | |
| Outcomes: | | | | | | | | | | | | | | | | | | | | | | | | |
| 19. Anxiety | 3.62 | 1.52 | -04 | -12 | -06 | -13 | -15 | 03 | -12 | -12 | 29 | -07 | 02 | -09 | -01 | -30 | -25 | -17 | 24 | 45 | 76 | | | |
| 20. Time stress | 3.20 | 1.27 | 07 | -04 | -01 | -05 | -10 | 16 | -01 | 02 | 26 | -02 | 08 | -07 | -01 | -25 | -10 | -02 | 19 | 38 | 69 | 82 | | |
| 21. Felt stress | 4.42 | 1.49 | 20 | -01 | 12 | 07 | 02 | 18 | 01 | 14 | 27 | 05 | -08 | 04 | 06 | -16 | -04 | 04 | 18 | 31 | 67 | 57 | 74 | |
| 22. Exhaustion | 2.67 | 1.17 | -19 | -16 | -15 | -28 | -22 | -04 | -17 | -25 | 29 | -21 | 16 | -18 | -08 | -43 | -33 | -34 | 32 | 40 | 66 | 63 | 48 | 89 |

Note: N = 418; PDM = Participation in decision-making; Complexity = mean of all seven job characteristics; OP = occupational prestige; GNS = Growth need strength; Decimals omitted from correlations and reliabilities; Reliabilities (coefficient alpha) on diagonal; $r = .10$, $p < .05$; $r = .13$, $p < .01$.

Table 4.

Analysis of Variance of the Curvilinear Relationship between Job Characteristics (Complexity) and Stress

Part A. Tests of Curvilinear Relationships of Task Significance-Stress and Responsibility-Stress

| | Outcomes | | | |
|---|---|---|---|---|
| Predictors | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Significance | -.080 | -.018 | .131* | -.140** |
| $F_2$ | 1.940 | .139 | 5.510* | 10.350** |
| $R^2$ | .005 | .000 | .014 | .025 |
| $(\text{Significance})^2$ | .040 | .026 | .040 | .104** |
| $F_2$ overall | 1.540 | .385 | 3.330* | 11.780** |
| $R^2$ | .007 | .002 | .016 | .055 |
| $\Delta R^2$ | .002 (N.S.) | .002 (N.S.) | .002 (N.S.) | .030 ($p$ <.01) |
| Responsibility | .028 | .182** | .248** | -.040 |
| $F_2$ | .130 | 8.210** | 11.420** | .482 |
| $R^2$ | .000 | .020 | .028 | .001 |
| $(\text{Responsibility})^2$ | .059 | .092 | .039 | .048 |
| $F_2$ overall | .418 | 5.380** | 5.870** | .640 |
| $R^2$ | .002 | .026 | .029 | .003 |
| $\Delta R^2$ | .002 (N.S.) | .006 (N.S.) | .001 (N.S.) | .002 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

| | Outcomes | | | |
|---|---|---|---|---|
| Predictors | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Variety | -.049 | .053 | .175** | -.140** |
| $F_2$ | 1.080 | 1.840 | 15.020** | 15.310** |
| $R^2$ | .003 | .005 | .040 | .040 |
| $(\text{Variety})^2$ | .009 | .002 | .018 | .030 |
| $F_2$ overall | .590 | .920 | 7.740** | 8.710** |
| $R^2$ | .003 | .005 | .040 | .040 |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| Identity | -.119 | -.032 | .005 | -.128** |
| $F_2$ | 5.050* | .530 | .009 | 9.810** |
| $R^2$ | .012 | .001 | .000 | .023 |
| $(\text{Identity})^2$ | .057 | .024 | .100** | .050* |
| $F_2$ overall | 4.000* | .640 | 4.800** | 6.870** |
| $R^2$ | .019 | .003 | .023 | .033 |
| $\Delta R^2$ | .007 (N.S.) | .002 (N.S.) | .023 ($p$ <.01) | .010 ($p$ <.05) |
| Autonomy | -.154** | -.058 | .072 | -.235** |
| $F_2$ | 8.500** | 1.640 | 1.820 | 33.240** |
| $R^2$ | .020 | .004 | .004 | .076 |
| $(\text{Autonomy})^2$ | .007 | .035 | .023 | -.001 |
| $F_2$ overall | 4.040** | 1.640 | 1.160 | 16.580** |
| $R^2$ | .020 | .008 | .005 | .076 |
| $\Delta R^2$ | .000 (N.S.) | .004 (N.S.) | .001 (N.S.) | .000 (N.S.) |

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Feedback | -.137* | -.083 | .045 | -.184** |
| $F_2$ | 6.140* | 3.270 | .683 | 19.270** |
| $R^2$ | .015 | .008 | .002 | .045 |
| $(\text{Feedback})^2$ | -.005 | .003 | .018 | .005 |
| $F_2$ overall | 3.070* | 1.640 | .474 | 9.630** |
| $R^2$ | .015 | .008 | .002 | .045 |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| PDM[11] | -.211* | -.007 | .026 | .228** |
| $F_2$ | 5.500* | .008 | .089 | 10.950** |
| $R^2$ | .013 | .000 | .000 | .027 |
| $(\text{PDM})^2$ | .100 | .064 | .098 | .034 |
| $F_2$ overall | 3.440* | .399 | .721 | 5.600** |
| $R^2$ | .017 | .002 | .003 | .028 |
| $\Delta R^2$ | .004 (N.S.) | .002 (N.S.) | .003 (N.S.) | .001 (N.S.) |
| Incumbent_reported complexity | -.200* | .027 | .249** | -.340** |
| $F_2$ | 4.860* | .122 | 7.860** | 24.200** |
| $R^2$ | .012 | .000 | .020 | .059 |
| $(\text{Incumbent\_reported complexity})^2$ | .126 | .082 | .110 | .155* |
| $F_2$ overall | 3.350* | .602 | 4.680** | 14.680** |
| $R^2$ | .017 | .003 | .023 | .071 |
| $\Delta R^2$ | .005 (N.S.) | .003 (N.S.) | .003 (N.S.) | .012 ($p$ <.05) |
| DOT complexity | -.058 | -.018 | .031 | -.117** |
| $F_2$ | 2.450 | .324 | .755 | 17.470** |
| $R^2$ | .006 | .001 | .002 | .041 |
| $(\text{DOT complexity})^2$ | -.002 | .009 | -.021 | .050** |
| $F_2$ overall | 1.230 | .371 | 1.270 | 17.520** |
| $R^2$ | .006 | .002 | .006 | .080 |
| $\Delta R^2$ | .000 (N.S.) | .001 (N.S.) | .004 (N.S.) | .039 ($p$ <.01) |
| Occupational Prestige (OP) | -.011* | -.007 | .003 | -.015** |
| $F_2$ | 4.040* | 2.590 | .400 | 13.320** |
| $R^2$ | .010 | .006 | .001 | .032 |
| $(\text{OP})^2$ | -.0001 | -.0001 | -.0001 | .0001** |
| $F_2$ overall | 2.020 | 1.330 | 1.780 | 10.690** |
| $R^2$ | .010 | .006 | .008 | .050 |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .007 (N.S.) | .018 ($p$ <.01) |

[11] PDM = Participation in decision-making

* $p < .05$

** $p < .01$

Table 5.

Tests of Interactions between Job Design Variables and Growth Need Strength (GNS) in Predicting Job Stress

Part A. Tests Using Hypothesized Variables

| | Outcomes | | | |
|---|---|---|---|---|
| Predictors | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Variety | -.056 | .047 | .167** | -.137** |
| GNS | .059 | .019 | .062 | -.036 |
| $F_2$ | .716 | .804 | 7.740** | 7.750** |
| $R^2$ | .004 | .004 | .038 | .039 |
| Variety x GNS | .037 | .048 | .044 | .027 |
| $F_2$ overall | .632 | .900 | 5.400** | 5.300** |
| $R^2$ | .005 | .007 | .040 | .040 |
| $\Delta R^2$ | .001 (N.S.) | .003 (N.S.) | .002 (N.S.) | .001 (N.S.) |
| Identity | -.153** | -.050 | | |
| GNS | .075 | .054 | | |
| $F_2$ | 4.040* | .749 | | |
| $R^2$ | .020 | .004 | | |
| Identity x GNS | .0001 | -.019 | | |
| $F_2$ overall | 2.686* | .544 | | |
| $R^2$ | .020 | .004 | | |
| $\Delta R^2$ | .001 (N.S.) | .000 (N.S.) | | |
| Significance | -.066 | -.023 | .127* | |
| GNS | .038 | .042 | .130 | |
| $F_2$ | .707 | .261 | 3.884* | |
| $R^2$ | .004 | .001 | .020 | |
| Significance x GNS | .110 | .064 | .104 | |
| $F_2$ overall | 1.670 | .745 | 3.76* | |
| $R^2$ | .013 | .006 | .028 | |
| $\Delta R^2$ | .009 (N.S.) | .005 (N.S.) | .008 (N.S.) | |
| Autonomy | -.174** | -.073 | .054 | -.243** |
| GNS | .097 | .067 | .119 | -.009 |
| $F_2$ | 4.714** | 1.298 | 1.750 | 17.132** |
| $R^2$ | .024 | .007 | .009 | .082 |
| Autonomy x GNS | .019 | -.019 | .005 | -.0001 |
| $F_2$ overall | 3.166* | .907 | 1.166 | 11.39** |
| $R^2$ | .024 | .007 | .009 | .082 |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| Feedback | -.153** | -.097* | .033 | -.173** |
| GNS | .069 | .064 | .131 | -.057 |
| $F_2$ | 3.602* | 2.179 | 1.462 | 8.767** |
| $R^2$ | .018 | .012 | .007 | .043 |
| Feedback x GNS | .144* | .113* | .095 | .136** |
| $F_2$ overall | 4.069** | 2.920* | 1.727 | 8.490** |
| $R^2$ | .031 | .022 | .013 | .063 |
| $\Delta R^2$ | .013 ($p$ <.05) | .010 ($p$ <.05) | .006 | .020 ($p$ <.01) |

| Predictors | Outcomes: Anxiety | Time Stress | Felt Stress | Exhaustion |
|---|---|---|---|---|
| Responsibility | .031 | .186** | .242** | -.018 |
| GNS | .025 | -.006 | .079 | -.095 |
| $F_2$ | .136 | 3.919* | 6.145** | 1.057 |
| $R^2$ | .001 | .020 | .031 | .005 |
| Responsibility x GNS | .067 | -.020 | .028 | -.021 |
| $F_2$ overall | .281 | 2.630* | 4.125** | .734 |
| $R^2$ | .002 | .020 | .031 | .006 |
| $\Delta R^2$ | .001 (N.S.) | .000 (N.S.) | .000 (N.S.) | .001 (N.S.) |
| PDM[a] | -.219* | .009 | .030 | -.202** |
| GNS | .078 | .038 | .133 | -.057 |
| $F_2$ | 2.777 | .151 | 1.337 | 4.970** |
| $R^2$ | .014 | .001 | .007 | .025 |
| PDM x GNS | .270* | -.052 | .180 | .068 |
| $F_2$ overall | 4.082** | .216 | 1.934 | 3.543* |
| $R^2$ | .031 | .002 | .015 | .027 |
| $\Delta R^2$ | .017 ($p$ <.01) | .001 (N.S.) | .008 (N.S.) | .002 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Outcomes: Anxiety | Time Stress | Felt Stress | Exhaustion |
|---|---|---|---|---|
| Incumbent_reported complexity | -.240* | .002 | .223* | |
| GNS | .097 | .039 | .080 | |
| $F_2$ | 3.245* | .145 | 4.165* | |
| $R^2$ | .017 | .001 | .021 | |
| Incumbent_reported complexity x GNS | .188 | .063 | .132 | |
| $F_2$ overall | 3.320* | .281 | 3.393* | |
| $R^2$ | .025 | .002 | .026 | |
| $\Delta R^2$ | .008 (N.S.) | .001 (N.S.) | .005 (N.S.) | |
| DOT complexity | .062 | -.025 | .023 | |
| GNS | .049 | .042 | .119 | |
| $F_2$ | 1.315 | .385 | 1.334 | |
| $R^2$ | .007 | .002 | .007 | |
| DOT complexity x GNS | .025 | .043 | .017 | |
| $F_2$ overall | .973 | .673 | .934 | |
| $R^2$ | .007 | .005 | .007 | |
| $\Delta R^2$ | .000 (N.S.) | .003 (N.S.) | .000 (N.S.) | |
| Occupational Prestige (OP) | -.110* | -.009* | .002 | |
| GNS | .053 | .058 | .124 | |
| $F_2$ | 2.056 | 2.049 | 1.229 | |
| $R^2$ | .010 | .010 | .006 | |
| OP x GNS | .003 | .005 | -.004 | |
| $F_2$ overall | 1.443 | 1.657 | .951 | |
| $R^2$ | .010 | .012 | .007 | |
| $\Delta R^2$ | .000 (N.S.) | .002 (N.S.) | .001 (N.S.) | |

[a] PDM = Participation in decision-making; * $p$ < .05; ** $p$ < .01

Table 6.

**Tests of Interactions between the Five Curvilinear Stressors[a] and Growth Need Strength (GNS) in Predicting Job Stress**

Part A. Tests Using Hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Felt stress | | |
| Step 1: Identity | -.981** | | | |
| $(\text{Identity})^2$ | .101** | | | |
| GNS | .137 | 4.000* | .029 | |
| Step 2: Identity x GNS | .007 | 3.000* | .029 | .000 (N.S.) |
| Step 3: $(\text{Identity})^2$ x GNS | .022 | 2.457* | .030 | .001 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Identity | -.579* | | | |
| $(\text{Identity})^2$ | .047 | | | |
| GNS | -.065 | 4.735** | .035 | |
| Step 2: Identity x GNS | -.079 | 4.325** | .042 | .007 (N.S.) |
| Step 3: $(\text{Identity})^2$ x GNS | .119** | 6.596 | .077 | .035 ($p < .01$) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Significance | -1.128** | | | |
| $(\text{Significance})^2$ | .103** | | | |
| GNS | -.069 | 8.026* | .057 | |
| Step 2: Significance x GNS | .066 | 6.629** | .063 | .006 (N.S.) |
| Step 3: $(\text{Significance})^2$ x GNS | .037 | 5.706** | .068 | .005 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.653** | | | |
| (Incumbent_reported complexity)$^2$ | .161* | | | |
| GNS | -.024 | 9.455** | .069 | |
| Step 2: | | | | |
| Incumbent_reported complexity x GNS | .035 | 7.125** | .070 | .001 (N.S.) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x GNS | -.013 | 5.691** | .070 | .000 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: DOT complexity | -.625** | | | |
| (DOT complexity)$^2$ | .051** | | | |
| GNS | -.020 | 11.499** | .080 | |
| Step 2: DOT complexity x GNS | -.009 | 8.621** | .080 | .000 (N.S.) |
| Step 3: (DOT complexity)$^2$ x GNS | -.008 | 6.948** | .080 | .000 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Occupational prestige (OP) | -.069** | | | |
| (OP)$^2$ | .0001** | | | |
| GNS | -.044 | 7.023** | .050 | |
| Step 2: OP x GNS | .003 | 5.320** | .051 | .001 (N.S.) |
| Step 3: (OP)$^2$ x GNS | -.0001 | 4.305** | .051 | .000 (N.S.) |

" Curvilinear stressors = task identity, task significance, incumbent_reported job complexity, DOT job complexity, and occupational prestige. These variables have curvilinear relationships with stress.

* $p < .05$

** $p < .01$

Table 7.

Tests of Interactions between Job Design Variables and S-V Match in Predicting Job Stress

Part A. Tests Using Hypothesized Variables

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Variety | .075 | .107* | .236** | .009 |
| S-V match | -.189** | -.074 | -.083 | -.243** |
| $F_2$ | 6.245** | 2.524 | 9.840** | 26.479** |
| $R^2$ | .031 | .013 | .048 | .120 |
| Variety x S-V match | -.033 | -.041 | .002 | -.012 |
| $F_2$ overall | 4.583** | 2.636* | 6.545** | 17.122** |
| $R^2$ | .034 | .020 | .048 | .120 |
| $\Delta R^2$ | .003 (N.S.) | .007 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| Identity | -.109** | -.047 | | |
| S-V match | -.125** | -.004 | | |
| $F_2$ | 7.422** | .582 | | |
| $R^2$ | .036 | .003 | | |
| Identity x S-V match | .072* | .008 | | |
| $F_2$ overall | 6.759** | .420 | | |
| $R^2$ | .049 | .003 | | |
| $\Delta R^2$ | .013 ($p$ <.05) | .000 (N.S.) | | |
| Significance | -.004 | -.012 | .113 | |
| S-V match | -.145** | -.010 | .015 | |
| $F_2$ | 5.360** | .091 | 2.364 | |
| $R^2$ | .027 | .000 | .012 | |
| Significance x S-V match | .011 | .010 | .033 | |
| $F_2$ overall | 3.604* | .103 | 1.941 | |
| $R^2$ | .027 | .001 | .014 | |
| $\Delta R^2$ | .000 (N.S.) | .001 (N.S.) | .002 (N.S.) | |
| Autonomy | -.090 | -.054 | .069 | -.149** |
| S-V match | -.117* | .004 | .026 | -.190** |
| $F_2$ | 6.532** | .632 | 1.305 | 33.052** |
| $R^2$ | .032 | .003 | .007 | .145 |
| Autonomy x S-V match | .035 | .028 | .026 | .031 |
| $F_2$ overall | 4.741** | .761 | 1.089 | 22.662** |
| $R^2$ | .035 | .006 | .008 | .149 |
| $\Delta R^2$ | .003 (N.S.) | .003 (N.S.) | .001 (N.S.) | .004 (N.S.) |
| Feedback | -.105 | -.092 | .015 | -.091* |
| S-V match | -.119* | .011 | .045 | -.214** |
| $F_2$ | 6.965** | 1.731 | .650 | 28.887** |
| $R^2$ | .034 | .009 | .003 | .129 |
| Feedback x S-V match | .019 | .033 | -.036 | .028 |
| $F_2$ overall | 4.750** | 1.652 | .873 | 19.728** |
| $R^2$ | .035 | .013 | .007 | .132 |
| $\Delta R^2$ | .001 (N.S.) | .004 (N.S.) | .004 (N.S.) | .003 (N.S.) |

| Predictors | Outcomes: Anxiety | Time Stress | Felt Stress | Exhaustion |
|---|---|---|---|---|
| Responsibility | .132 | .234** | .252** | .110 |
| S-V match | -.172** | -.059 | -.0001 | -.260** |
| $F_2$ | 6.661** | 6.031 | 5.561** | 28.293** |
| $R^2$ | .033 | .029 | .027 | .127 |
| Responsibility x S-V match | -.025 | -.075 | .006 | -.0001 |
| $F_2$ overall | 4.534** | 5.424** | 3.705* | 18.814** |
| $R^2$ | .034 | .039 | .028 | .127 |
| $\Delta R^2$ | .001 (N.S.) | .010 ($p$ <.05) | .001 (N.S.) | .000 (N.S.) |
| PDM[11] | -.118 | .032 | .0001 | -.040 |
| S-V match | -.124* | -.020 | .049 | -.231** |
| $F_2$ | 6.105** | .141 | .618 | 26.627** |
| $R^2$ | .030 | .001 | .003 | .120 |
| PDM x S-V match | .014 | -.046 | .020 | .035 |
| $F_2$ overall | 4.082** | .413 | .455 | 17.987** |
| $R^2$ | .030 | .003 | .003 | .122 |
| $\Delta R^2$ | .000 (N.S.) | .002 (N.S.) | .000 (N.S.) | .002 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Outcomes: Anxiety | Time Stress | Felt Stress | Exhaustion |
|---|---|---|---|---|
| Incumbent_reported complexity | -.071 | .068 | .274* | |
| S-V match | -.127* | -.032 | -.026 | |
| $F_2$ | 5.566** | .326 | 3.844* | |
| $R^2$ | .028 | .002 | .019 | |
| Incumbent_reported complexity x S-V match | .027 | -.015 | .055 | |
| $F_2$ overall | 3.780* | .249 | 2.908* | |
| $R^2$ | .028 | .002 | .022 | |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .003 (N.S.) | |
| DOT complexity | -.009 | -.013 | .020 | |
| S-V match | -.146** | -.015 | .034 | |
| $F_2$ | 5.898** | .233 | .639 | |
| $R^2$ | .028 | .001 | .003 | |
| DOT complexity x S-V match | .003 | -.001 | .019 | |
| $F_2$ overall | 3.929** | .156 | .634 | |
| $R^2$ | .028 | .001 | .005 | |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .002 (N.S.) | |
| Occupational Prestige (OP) | -.005 | -.007 | .002 | |
| S-V match | -.136** | -.001 | .039 | |
| $F_2$ | 6.318** | 1.297 | .559 | |
| $R^2$ | .030 | .006 | .003 | |
| OP x S-V match | -.002 | -.0001 | -.0001 | |
| $F_2$ overall | 4.304** | .891 | .375 | |
| $R^2$ | .031 | .007 | .003 | |
| $\Delta R^2$ | .001 (N.S.) | .001 (N.S.) | .000 (N.S.) | |

[11] PDM = Participation in decision-making; * $p$ < .05; ** $p$ < .01

Table 8.

Tests of Interactions between the Five Curvilinear Stressors[a] and S-V Match in Predicting Job Stress

Part A. Tests Using Hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Felt stress | | |
| Step 1: Identity | -.959** | | | |
| $(\text{Identity})^2$ | .099** | | | |
| S-V match | .041 | 3.483* | .025 | |
| Step 2: Identity x S-V match | .063* | 3.634** | .035 | .010 ($p$ <.05) |
| Step 3: $(\text{Identity})^2$ x S-V match | -.024 | 3.228** | .039 | .004 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Identity | -.617* | | | |
| $(\text{Identity})^2$ | .057 | | | |
| S-V match | -.224** | 20.382** | .132 | |
| Step 2: Identity x S-V match | .052* | 11.641** | .142 | .010 ($p$ <.05) |
| Step 3: $(\text{Identity})^2$ x S-V match | -.024 | 13.914** | .148 | .006 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Significance | -1.017** | | | |
| $(\text{Significance})^2$ | .103** | | | |
| S-V match | -.224** | 22.577** | .145 | |
| Step 2: Significance x S-V match | .040 | 17.530** | .150 | .005 (N.S.) |
| Step 3: $(\text{Significance})^2$ x S-V match | .043** | 15.802** | .166 | .016 ($p$ <.01) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.218** | | | |
| (Incumbent_reported complexity)$^2$ | .134* | | | |
| S-V match | -.200** | 19.033** | .129 | |
| Step 2: | | | | |
| Incumbent_reported complexity x S-V match | .024 | 14.296** | .129 | .000 (N.S.) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x S-V match | .0001 | 14.408** | .129 | .000 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: DOT complexity | -.455** | | | |
| (DOT complexity)$^2$ | .040** | | | |
| S-V match | -.193** | 22.593** | .144 | |
| Step 2: DOT complexity x S-V match | .027 | 17.480** | .148 | .004 (N.S.) |
| Step 3: | | | | |
| (DOT complexity)$^2$ x S-V match | -.002 | 13.969** | .148 | .000 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Occupational prestige (OP) | -.043* | | | |
| (OP)$^2$ | .0001* | | | |
| S-V match | -.206** | 19.700** | .128 | |
| Step 2: OP x S-V match | .004 | 15.222** | .132 | .004 (N.S.) |
| Step 3: (OP)$^2$ x S-V match | -.0001 | 12.720** | .137 | .005 (N.S.) |

" Curvilinear stressors = task identity, task significance, incumbent_reported job complexity, DOT job complexity, and occupational prestige. These variables have curvilinear relationships with stress.

* $p < .05$

** $p < .01$

Table 9.

**Tests of Interactions between Job Design Variables and Education in Predicting Job Stress**

Part A. Tests Using Hypothesized Variables

| | Outcomes | | | |
|---|---|---|---|---|
| Predictors | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Variety | -.039 | .075 | .185** | -.150** |
| Education | .0001 | -.028 | .0001 | .016 |
| $F_2$ | .351 | 2.040 | 8.499** | 8.087** |
| $R^2$ | .002 | .010 | .041 | .040 |
| Variety x Education | -.013 | -.016 | -.007 | -.011 |
| $F_2$ overall | .408 | 1.779 | 5.714** | 5.609** |
| $R^2$ | .003 | .014 | .042 | .042 |
| $\Delta R^2$ | .001 (N.S.) | .004 (N.S.) | .001 (N.S.) | .002 (N.S.) |
| Identity | -.144** | -.047 | | |
| Education | -.003 | -.017 | | |
| $F_2$ | 3.640* | .873 | | |
| $R^2$ | .018 | .004 | | |
| Identity x Education | .001 | -.008 | | |
| $F_2$ overall | 2.422 | .677 | | |
| $R^2$ | .018 | .005 | | |
| $\Delta R^2$ | .000 (N.S.) | .001 (N.S.) | | |
| Autonomy | -.148** | -.049 | .077 | -.245** |
| Education | .001 | -.016 | .022 | .006 |
| $F_2$ | 3.580* | .869 | 1.515 | 17.280** |
| $R^2$ | .018 | .004 | .008 | .082 |
| Autonomy x Education | -.003 | -.018 | -.012 | -.005 |
| $F_2$ overall | 2.387 | .954 | 1.133 | 11.531** |
| $R^2$ | .018 | .007 | .009 | .082 |
| $\Delta R^2$ | .000 (N.S.) | .003 (N.S.) | .001 (N.S.) | .000 (N.S.) |
| Responsibility | .034 | .224** | .248** | -.044 |
| Education | -.007 | -.035 | .007 | -.0001 |
| $F_2$ | .109 | 5.900** | 5.610** | .268 |
| $R^2$ | .001 | .029 | .028 | .001 |
| Responsibility x Education | -.001 | -.015 | -.005 | -.012 |
| $F_2$ overall | .073 | 4.069** | 3.741* | .289 |
| $R^2$ | .001 | .030 | .028 | .002 |
| $\Delta R^2$ | .000 (N.S.) | .001 (N.S.) | .000 (N.S.) | .001 (N.S.) |
| PDM[a] | -.217* | .028 | .024 | -.226** |
| Education | .006 | -.019 | .024 | .008 |
| $F_2$ | 2.767 | .389 | .529 | 5.041** |
| $R^2$ | .014 | .002 | .003 | .025 |
| PDM x Education | .008 | -.024 | .001 | -.017 |
| $F_2$ overall | 1.864 | .536 | .352 | 3.519* |
| $R^2$ | .014 | .004 | .003 | .026 |
| $\Delta R^2$ | .000 (N.S.) | .002 (N.S.) | .000 (N.S.) | .001 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Significance | -.075 | -.017 | .120* | |
| Education | -.005** | -.018 | .026 | |
| $F_2$ | .852 | .387 | 2.816 | |
| $R^2$ | .004 | .002 | .014 | |
| Significance x Education | -.012 | -.032 | -.002 | |
| $F_2$ overall | .685 | 1.478 | 1.876 | |
| $R^2$ | .005 | .011 | .014 | |
| $\Delta R^2$ | .001 (N.S.) | .009 (N.S.) | .000 (N.S.) | |
| Feedback | -.155** | -.084 | .029 | -.183** |
| Education | .0001 | -.015 | .025 | .004 |
| $F_2$ | 3.735** | 1.887 | .632 | 8.849** |
| $R^2$ | .019 | .010 | .003 | .044 |
| Feedback x Education | -.012 | -.005 | .0001 | -.008 |
| $F_2$ overall | 2.615 | 1.290 | .420 | 5.992** |
| $R^2$ | .020 | .010 | .003 | .044 |
| $\Delta R^2$ | .001 (N.S.) | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| Incumbent_reported complexity | -.222* | .045 | .235* | |
| Education | .007 | -.020 | .013 | |
| $F_2$ | 2.797 | .484 | 3.827* | |
| $R^2$ | .014 | .002 | .019 | |
| Incumbent_reported complexity x Education | -.014 | -.041 | -.010 | |
| $F_2$ overall | 1.916 | 1.010 | 2.578 | |
| $R^2$ | .015 | .008 | .019 | |
| $\Delta R^2$ | .001 (N.S.) | .006 (N.S.) | .000 (N.S.) | |
| DOT complexity | -.060 | .0001 | .030 | |
| Education | .010 | -.022 | .013 | |
| $F_2$ | 1.076 | .483 | .661 | |
| $R^2$ | .005 | .002 | .003 | |
| DOT complexity x Education | -.022 | -.007 | -.032* | |
| $F_2$ overall | 1.570 | .448 | 2.390 | |
| $R^2$ | .011 | .003 | .017 | |
| $\Delta R^2$ | .006 (N.S.) | .001 (N.S.) | .014 ($p$ <.05) | |
| Occupational Prestige (OP) | -.012* | -.006 | .002 | |
| Education | .012 | -.012 | .021 | |
| $F_2$ | 2.090 | 1.453 | .626 | |
| $R^2$ | .010 | .007 | .003 | |
| OP x Education | -.002 | -.001 | -.004* | |
| $F_2$ overall | 1.686 | 1.153 | 2.090 | |
| $R^2$ | .012 | .009 | .015 | |
| $\Delta R^2$ | .002 (N.S.) | .002 (N.S.) | .012 ($p$ <.05) | |

[a] PDM = Participation in decision-making

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

Table 10.

**Tests of Interactions between the Five Curvilinear Stressors[a] and Education in Predicting Job Stress**

Part A. Tests Using Hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Felt stress | | |
| Step 1: Identity | -.972** | | | |
| $(\text{Identity})^2$ | .101** | | | |
| Education | .022 | 3.420* | .025 | |
| Step 2: Identity x Education | -.008 | 2.617* | .026 | .001 (N.S.) |
| Step 3: $(\text{Identity})^2$ x Education | .010 | 2.295* | .028 | .002 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Identity | -.610* | | | |
| $(\text{Identity})^2$ | .050* | | | |
| Education | .0001 | 4.556** | .033 | |
| Step 2: Identity x Education | -.027 | 4.380** | .042 | .009 (N.S.) |
| Step 3: $(\text{Identity})^2$ x Education | .017* | 4.380** | .052 | .010 ($p < .05$) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: Significance | -1.143** | | | |
| $(\text{Significance})^2$ | .104** | | | |
| Education | .0001 | 7.810** | .056 | |
| Step 2: Significance x Education | -.016 | 6.126** | .058 | .002 (N.S.) |
| Step 3: $(\text{Significance})^2$ x Education | .007 | 4.981** | .059 | .001 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.609** | | | |
| $(\text{Incumbent\_reported complexity})^2$ | .153* | | | |
| Education | .012 | 9.852** | .071 | |
| Step 2: | | | | |
| Incumbent_reported complexity x Education | -.045 | 8.180** | .078 | .007 (N.S.) |
| Step 3: | | | | |
| $(\text{Incumbent\_reported complexity})^2$ x Education | .002 | 5.528** | .079 | .001 (N.S.) |

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: DOT complexity | -.608** | | | |
| (DOT complexity)$^2$ | .047** | | | |
| Education | .024 | 12.023** | .082 | |
| Step 2: DOT complexity x Education | -.017 | 9.563** | .087 | .005 (N.S.) |
| Step 3: (DOT complexity)$^2$ x Education | -.004 | 7.821** | .089 | .002 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Occupational prestige (OP) | -.068** | | | |
| (OP)$^2$ | .0001** | | | |
| Education | .026 | 7.569** | .053 | |
| Step 2: OP x Education | -.001 | 5.831** | .055 | .002 (N.S.) |
| Step 3: (OP)$^2$ x Education | .0001 | 4.676** | .055 | .000 (N.S.) |

" Curvilinear stressors = task identity, task significance, incumbent_reported job complexity, DOT job complexity, and occupational prestige. These variables have curvilinear relationships with stress.

* $p < .05$

** $p < .01$

Table 11.

Tests of Interactions between Job Design Variables and Tenure in Predicting Job Stress

Part A: Tests Using Hypothesized Variables

(1) Tenure 1[a]

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Variety | -.040 | .068 | .181** | -.132** |
| Tenure 1 | .0001 | -.0001 | .007 | -.017 |
| $F_2$ | .351 | 1.502 | 8.687** | 9.114** |
| $R^2$ | .002 | .008 | .042 | .045 |
| Variety x Tenure 1 | .006 | .0001 | -.001 | .002 |
| $F_2$ overall | 0.313 | .999 | 5.782** | 6.084** |
| $R^2$ | .002 | .008 | .042 | .045 |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| Identity | -.144** | -.046 | | |
| Tenure 1 | -.002 | .004 | | |
| $F_2$ | 3.650* | .580 | | |
| $R^2$ | .018 | .003 | | |
| Identity x Tenure 1 | .005 | .0001 | | |
| $F_2$ overall | 2.530 | .386 | | |
| $R^2$ | .019 | .003 | | |
| $\Delta R^2$ | .001 (N.S.) | .000 (N.S.) | | |
| Autonomy | -.150** | -.055 | .073 | -.234** |
| Tenure 1 | .004 | .006 | .015 | -.016 |
| $F_2$ | 3.616* | .744 | 1.702 | 18.493** |
| $R^2$ | .018 | .004 | .009 | .087 |
| Autonomy x Tenure 1 | -.007 | -.009 | -.011 | -.010 |
| $F_2$ overall | 2.503 | .733 | 1.389 | 12.727** |
| $R^2$ | .019 | .006 | .010 | .089 |
| $\Delta R^2$ | .001 (N.S.) | .002 (N.S.) | .001 (N.S.) | .002 (N.S.) |
| Responsibility | .033 | .203** | .243** | -.019 |
| Tenure 1 | -.003 | -.003 | .009 | -.024* |
| $F_2$ | .094 | 4.666** | 5.780** | 2.602 |
| $R^2$ | .0004 | .023 | .029 | .013 |
| Responsibility x Tenure 1 | .002 | -.010 | -.008 | -.004 |
| $F_2$ overall | .066 | 3.311* | 3.948** | 1.763 |
| $R^2$ | .0005 | .024 | .029 | .013 |
| $\Delta R^2$ | .0001 (N.S.) | .001 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| PDM[c] | -.214* | .015 | .030 | -.211** |
| Tenure 1 | .0001 | .004 | .017 | -.022* |
| $F_2$ | 2.756 | .069 | .845 | 7.173** |
| $R^2$ | .014 | .000 | .004 | .035 |
| PDM x Tenure 1 | .030 | -.003 | -.001 | .001 |
| $F_2$ overall | 2.532 | .054 | .563 | 4.773** |
| $R^2$ | .019 | .000 | .004 | .035 |
| $\Delta R^2$ | .005 (N.S.) | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) |

(2) Tenure 2[b]

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Variety | -.033 | .066 | .186** | -.132** |
| Tenure 2 | -.0001 | .002 | .003 | -.005 |
| $F_2$ | .023 | 1.526 | 9.165** | 7.758** |
| $R^2$ | .001 | .008 | .040 | .038 |
| Variety x Tenure 2 | .002 | -.007 | -.002 | -.001 |
| $F_2$ overall | .205 | 1.530 | 6.117** | 5.174** |
| $R^2$ | .002 | .012 | .044 | .038 |
| $\Delta R^2$ | .001 (N.S.) | .004 (N.S.) | .004 (N.S.) | .000 (N.S.) |
| Identity | -.131** | -.047 | | |
| Tenure 2 | -.0001 | .006 | | |
| $F_2$ | 3.026* | .796 | | |
| $R^2$ | .015 | .004 | | |
| Identity x Tenure 2 | .002 | -.002 | | |
| $F_2$ overall | 2.067 | .593 | | |
| $R^2$ | .016 | .005 | | |
| $\Delta R^2$ | .001 (N.S.) | .001 (N.S.) | | |
| Autonomy | -.149** | -.057 | .072 | -.238** |
| Tenure 2 | .001 | .007 | .012 | -.008 |
| $F_2$ | 3.595* | .984 | 2.035 | 17.933** |
| $R^2$ | .018 | .005 | .010 | .084 |
| Autonomy x Tenure 2 | .004 | -.005 | -.002 | -.001 |
| $F_2$ overall | 2.507 | .981 | 1.400 | 11.947** |
| $R^2$ | .019 | .007 | .010 | .084 |
| $\Delta R^2$ | .001 (N.S.) | .002 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| Responsibility | .039 | .204** | .239** | -.013 |
| Tenure 2 | -.003 | -.002 | .005 | -.012 |
| $F_2$ | .132 | 4.654* | 5.724** | 1.590 |
| $R^2$ | .001 | .023 | .028 | .008 |
| Responsibility x Tenure 2 | .0001 | -.015* | -.002 | -.002 |
| $F_2$ overall | .092 | 4.659* | 3.823** | 1.105 |
| $R^2$ | .001 | .035 | .028 | .008 |
| $\Delta R^2$ | .000 (N.S.) | .012 ($p$<.05) | .000 (N.S.) | .000 (N.S.) |
| PDM | -.216* | -.017 | .019 | -.207** |
| Tenure 2 | .001 | .005 | .013 | -.010 |
| $F_2$ | 2.767 | .252 | 1.157 | 5.903** |
| $R^2$ | .014 | .001 | .006 | .029 |
| PDM x Tenure 2 | .005 | -.017* | -.0001 | -.005 |
| $F_2$ overall | 1.934 | 1.496 | .772 | 4.048 |
| $R^2$ | .015 | .011 | .006 | .030 |
| $\Delta R^2$ | .001 (N.S.) | .010 ($p$<.05) | .000 (N.S.) | .001 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

(1) Tenure 1[a]

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Significance | -.075 | -.015 | .113* | |
| Tenure 1 | .0001 | .004 | .014 | |
| $F_2$ | .834 | .098 | 2.825 | |
| $R^2$ | .004 | .001 | .014 | |
| Significance x Tenure 1 | -.010 | -.015 | -.015 | |
| $F_2$overall | .732 | .634 | 2.357 | |
| $R^2$ | .006 | .005 | .018 | |
| $\Delta R^2$ | .002 (N.S.) | .004 (N.S.) | .004 (N.S.) | |
| Feedback | -.155** | -.090 | .032 | -.180** |
| Tenure 1 | -.001 | .004 | .017 | -.024* |
| $F_2$ | 3.738* | 1.905 | .955 | 11.379** |
| $R^2$ | .019 | .010 | .005 | .055 |
| Feedback x Tenure 1 | .008 | .009 | .004 | .008 |
| $F_2$overall | 2.729* | 1.721 | .689 | 8.023** |
| $R^2$ | .020 | .013 | .005 | .058 |
| $\Delta R^2$ | .001 (N.S.) | .003 (N.S.) | .000 (N.S.) | .003 (N.S.) |
| Incumbent_reported complexity | -.222* | .030 | .231* | |
| Tenure 1 | .004 | .003 | .011 | |
| $F_2$ | 2.803 | .120 | 4.058* | |
| $R^2$ | .014 | .001 | .020 | |
| Incumbent_reported complexity x Tenure 1 | .007 | -.009 | -.004 | |
| $F_2$overall | 1.897 | .151 | 2.710* | |
| $R^2$ | .014 | .001 | .020 | |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) | |
| DOT complexity | -.057 | -.018 | .028 | |
| Tenure 1 | -.005 | .003 | .012 | |
| $F_2$ | 1.281 | .193 | .766 | |
| $R^2$ | .006 | .001 | .004 | |
| DOT complexity x Tenure 1 | .003 | -.0001 | .007 | |
| $F_2$overall | .906 | .135 | .744 | |
| $R^2$ | .007 | .001 | .006 | |
| $\Delta R^2$ | .001 (N.S.) | .000 (N.S.) | .002 (N.S.) | |
| Occupational Prestige (OP) | -.011 | -.008 | .003 | |
| Tenure 1 | -.002 | .005 | .012 | |
| $F_2$ | 2.030 | 1.403 | .583 | |
| $R^2$ | .010 | .007 | .003 | |
| OP x Tenure 1 | .0001 | -.0001 | -.0001 | |
| $F_2$overall | 1.357 | 1.204 | .393 | |
| $R^2$ | .010 | .009 | .003 | |
| $\Delta R^2$ | .000 (N.S.) | .002 (N.S.) | .000 (N.S.) | |

(2) Tenure 2[b]

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Significance | -.078 | -.017 | .112* | |
| Tenure 2 | -.0001 | .006 | .012 | |
| $F_2$ | .916 | .299 | 3.136* | |
| $R^2$ | .005 | .002 | .016 | |
| Significance x Tenure 2 | -.011 | -.005 | -.006 | |
| $F_2$ overall | 1.273 | .406 | 2.303 | |
| $R^2$ | .010 | .003 | .017 | |
| $\Delta R^2$ | .005 (N.S.) | .001 (N.S.) | .001 (N.S.) | |
| Feedback | -.134** | -.091 | .039 | -.173** |
| Tenure 2 | -.001 | .006 | .013 | -.012 |
| $F_2$ | 2.866 | 2.120 | 1.391 | 9.809** |
| $R^2$ | .014 | .011 | .007 | .048 |
| Feedback x Tenure 2 | -.0001 | -.004 | -.007 | .0001 |
| $F_2$ overall | 1.910 | 1.592 | 1.401 | 6.528** |
| $R^2$ | .014 | .012 | .011 | .048 |
| $\Delta R^2$ | .000 (N.S.) | .001 (N.S.) | .004 (N.S.) | .000 (N.S.) |
| Incumbent_reported complexity | -.211* | .022 | .231* | |
| Tenure 2 | .003 | .005 | .008 | |
| $F_2$ | 2.494 | .278 | 4.340* | |
| $R^2$ | .013 | .001 | .022 | |
| Incumbent_reported complexity x Tenure 2 | .001 | -.015 | -.006 | |
| $F_2$ overall | 1.664 | 1.187 | 2.992* | |
| $R^2$ | .013 | .009 | .022 | |
| $\Delta R^2$ | .000 (N.S.) | .008 (N.S.) | .000 (N.S.) | |
| DOT complexity | -.052 | -.014 | .025 | |
| Tenure 2 | .0001 | .006 | .012 | |
| $F_2$ | .965 | .343 | 1.373 | |
| $R^2$ | .005 | .002 | .007 | |
| DOT complexity x Tenure 2 | .004 | -.002 | .003 | |
| $F_2$ overall | .846 | .273 | 1.019 | |
| $R^2$ | .007 | .002 | .008 | |
| $\Delta R^2$ | .002 (N.S.) | .000 (N.S.) | .001 (N.S.) | |
| Occupational Prestige (OP) | -.010 | -.007 | .002 | |
| Tenure 2 | .003 | .009 | .012 | |
| $F_2$ | 1.479 | 1.289 | 1.221 | |
| $R^2$ | .007 | .007 | .006 | |
| OP x Tenure 2 | .0001 | -.0001 | -.0001 | |
| $F_2$ overall | .988 | 1.275 | 1.140 | |
| $R^2$ | .008 | .010 | .009 | |
| $\Delta R^2$ | .001 (N.S.) | .003 (N.S.) | .003 (N.S.) | |

[a] Tenure 1 = Years of working experience on the current job.

[b] Tenure 2 = Years of working experience on the same line of job.

[c] PDM = Participation in decision-making.

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

Table 12.

Tests of Interactions between the Five Curvilinear Stressors[a] and Tenure in Predicting Job Stress

Part A. Tests Using Hypothesized Variables

(1) Tenure 1[b]

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Felt stress | | |
| Step 1: Identity | -.944** | | | |
| (Identity)$^2$ | .098** | | | |
| Tenure 1 | .011 | 3.420* | .025 | |
| Step 2: Identity x Tenure 1 | .016 | 3.280* | .031 | .006 (N.S.) |
| Step 3: (Identity)$^2$ x Tenure 1 | .003 | 2.682* | .032 | .001 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Identity | -.650** | | | |
| (Identity)$^2$ | .054* | | | |
| Tenure 1 | -.028** | 6.904** | .049 | |
| Step 2: Identity x Tenure 1 | .006 | 5.361** | .051 | .002 (N.S.) |
| Step 3: (Identity)$^2$ x Tenure 1 | -.002 | 4.325** | .051 | .000 (N.S.) |

(2) Tenure 2[c]

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Felt stress | | |
| Step 1: Identity | -.945** | | | |
| (Identity)$^2$ | .098** | | | |
| Tenure 2 | .005 | 3.299* | .024 | |
| Step 2: Identity x Tenure 2 | .004 | 2.621* | .026 | .002 (N.S.) |
| Step 3: (Identity)$^2$ x Tenure 2 | -.005 | 2.555* | .031 | .005 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Identity | -.659* | | | |
| (Identity)$^2$ | .056* | | | |
| Tenure 2 | -.016* | 6.494** | .046 | |
| Step 2: Identity x Tenure 2 | -.0001 | 4.859** | .046 | .000 (N.S.) |
| Step 3: (Identity)$^2$ x Tenure 2 | -.002 | 4.028** | .048 | .002 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

(1) Tenure 1[b]

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: Significance | -1.127** | | | |
| (Significance)$^2$ | .104** | | | |
| Tenure 1 | -.023* | 9.482** | .067 | |
| Step 2: Significance x Tenure 1 | -.006 | 7.187** | .067 | .000 (N.S.) |
| Step 3: (Significance)$^2$ x Tenure 1 | -.007 | 5.976** | .070 | .003 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.576** | | | |
| (Incumbent_reported complexity)$^2$ | .152* | | | |
| Tenure 1 | -.015 | 10.432** | .075 | |
| Step 2: | | | | |
| Incumbent_reported complexity x Tenure 1 | -.005 | 7.828** | .075 | .000 (N.S.) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x Tenure 1 | .014 | 6.400** | .077 | .002 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: DOT complexity | -.607** | | | |
| (DOT complexity)$^2$ | .049** | | | |
| Tenure 1 | -.021* | 13.137** | .089 | |
| Step 2: DOT complexity x Tenure 1 | .003 | 9.876** | .089 | .000 (N.S.) |
| Step 3: (DOT complexity)$^2$ x Tenure 1 | .003 | 8.159** | .092 | .003 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Occupational prestige (OP) | -.066** | | | |
| (OP)$^2$ | .0001** | | | |
| Tenure 1 | -.020 | 8.377** | .059 | |
| Step 2: OP x Tenure 1 | .0001 | 6.268** | .059 | .000 (N.S.) |
| Step 3: (OP)$^2$ x Tenure 1 | -.0001 | 5.026** | .059 | .000 (N.S.) |

(2) Tenure 2[c]

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: Significance | -1.144** | | | |
| (Significance)$^2$ | .105** | | | |
| Tenure 2 | -.014* | 9.331** | .066 | |
| Step 2: Significance x Tenure 2 | .0001 | 6.981** | .066 | .000 (N.S.) |
| Step 3: (Significance)$^2$ x Tenure 2 | -.003 | 5.724** | .067 | .001 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.649** | | | |
| (Incumbent_reported complexity)$^2$ | .161* | | | |
| Tenure 2 | -.006 | 9.998** | .072 | |
| Step 2: | | | | |
| Incumbent_reported complexity x Tenure 2 | -.005 | 7.578** | .073 | .001 (N.S.) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x Tenure 2 | -.0001 | 6.047** | .073 | .000 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: DOT complexity | -.604** | | | |
| (DOT complexity)$^2$ | .049** | | | |
| Tenure 2 | -.009 | 12.267** | .084 | |
| Step 2: DOT complexity x Tenure 2 | .003 | 9.326** | .085 | .001 (N.S.) |
| Step 3: (DOT complexity)$^2$ x Tenure 2 | .001 | 7.552** | .086 | .001 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Occupational prestige (OP) | -.066** | | | |
| (OP)$^2$ | .0001** | | | |
| Tenure 2 | -.009 | 7.718** | .054 | |
| Step 2: OP x Tenure 2 | .0001 | 5.869** | .055 | .001 (N.S.) |
| Step 3: (OP)$^2$ x Tenure 2 | -.0001 | 4.689** | .055 | .000 (N.S.) |

[a] Curvilinear stressors = task identity, task significance, incumbent_reported job complexity, DOT job complexity, and occupational prestige. These variables have curvilinear relationships with stress.

[b] Tenure 1 = Tenure on current job.

[c] Tenure 2 = Tenure on the same line of job.

* $p < .05$

** $p < .01$

Table 13.

**Tests of Interactions between Job Design Variables and D-A Match in Predicting Job Stress**

Part A. Tests Using Hypothesized Variables

| | Outcomes | | | |
|---|---|---|---|---|
| Predictors | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Variety | .124* | .152** | .291** | -.008 |
| D-A match | -.444** | -.245** | -.288** | -.363** |
| $F_2$ | 15.038** | 7.465** | 15.479** | 25.726** |
| $R^2$ | .071 | .037 | .073 | .117 |
| Variety x D-A match | -.065 | -.046 | -.033 | -.009 |
| $F_2$ overall | 10.858** | 5.538** | 10.537** | 17.139** |
| $R^2$ | .077 | .041 | .074 | .117 |
| $\Delta R^2$ | .006 (N.S.) | .004 (N.S.) | .001 (N.S.) | .000 (N.S.) |
| Identity | -.080 | -.026 | | |
| D-A match | -.313** | -.110 | | |
| $F_2$ | 13.489** | 2.201 | | |
| $R^2$ | .064 | .011 | | |
| Identity x D-A match | .067 | -.012 | | |
| $F_2$ overall | 9.681** | 1.492 | | |
| $R^2$ | .069 | .011 | | |
| $\Delta R^2$ | .005 (N.S.) | .000 (N.S.) | | |
| Autonomy | -.040 | -.014 | .120* | -.145** |
| D-A match | -.320** | .111 | -.114 | -.291** |
| $F_2$ | 12.559** | 2.089 | 2.298 | 31.764** |
| $R^2$ | .060 | .011 | .012 | .140 |
| Autonomy x D-A match | -.042 | .015 | -.056 | -.003 |
| $F_2$ overall | 8.611** | 1.433 | 1.967 | 21.124** |
| $R^2$ | .062 | .011 | .015 | .140 |
| $\Delta R^2$ | .002 (N.S.) | .000 (N.S.) | .003 (N.S.) | .000 (N.S.) |
| Responsibility | .176* | .277** | .304** | .103 |
| D-A match | -.394** | -.201** | -.139 | -.400** |
| $F_2$ | 14.830** | 10.262** | 7.503** | 27.314** |
| $R^2$ | .070 | .050 | .037 | .123 |
| Responsibility x D-A match | -.105 | -.156** | -.072 | -.072 |
| $F_2$ overall | 10.663** | 9.286** | 5.359** | 18.864** |
| $R^2$ | .076 | .067 | .039 | .127 |
| $\Delta R^2$ | .006 (N.S.) | .017 ($p$ <.01) | .002 (N.S.) | .004 (N.S.) |
| PDM[a] | -.061 | .085 | .070 | -.051 |
| D-A match | -.324** | -.143* | -.068 | -.355** |
| $F_2$ | 12.540** | 2.589 | .522 | 25.991** |
| $R^2$ | .060 | .013 | .003 | .118 |
| PDM x D-A match | -.062 | -.126 | -.019 | -.079 |
| $F_2$ overall | 8.529** | 2.779* | .364 | 17.877** |
| $R^2$ | .061 | .021 | .003 | .121 |
| $\Delta R^2$ | .001 (N.S.) | .008 (N.S.) | .000 (N.S.) | .003 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Outcomes | | | |
|---|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress | Exhaustion |
| Significance | .024 | .019 | .152* | |
| D-A match | -.351** | -.127* | -.111 | |
| $F_2$ | 12.402** | 2.116 | 3.511* | |
| $R^2$ | .060 | .010 | .018 | |
| Significance x D-A match | .002 | .050 | .017 | |
| $F_2$ overall | 8.248** | 1.934 | 2.383 | |
| $R^2$ | .060 | .015 | .018 | |
| $\Delta R^2$ | .000 (N.S.) | .005 (N.S.) | .000 (N.S.) | |
| Feedback | -.063 | -.060 | .051 | -.082 |
| D-A match | -.313** | -.092 | -.079 | -.332** |
| $F_2$ | 12.916** | 2.759 | .719 | 27.599** |
| $R^2$ | .062 | .014 | .003 | .124 |
| Feedback x D-A match | -.063 | -.002 | -.097* | -.005 |
| $F_2$ overall | 9.187** | 1.835 | 1.904 | 18.360** |
| $R^2$ | .066 | .014 | .014 | .124 |
| $\Delta R^2$ | .004 (N.S.) | .000 (N.S.) | .011 ($p$ <.05) | .000 (N.S.) |
| Incumbent_reported complexity | .051 | .175 | .409** | |
| D-A match | -.363** | -.194** | -.223** | |
| $F_2$ | 12.434** | 3.812* | 7.554** | |
| $R^2$ | .060 | .019 | .037 | |
| Incumbent_reported complexity x D-A match | -.076 | -.061 | -.049 | |
| $F_2$ overall | 8.583** | 2.801* | 5.155** | |
| $R^2$ | .062 | .021 | .038 | |
| $\Delta R^2$ | .002 (N.S.) | .002 (N.S.) | .001 (N.S.) | |
| DOT complexity | .009 | .007 | .049 | |
| D-A match | -.364** | -.134* | -.093 | |
| $F_2$ | 14.088** | 2.534 | 1.198 | |
| $R^2$ | .065 | .012 | .006 | |
| DOT complexity x D-A match | -.069* | -.061* | -.017 | |
| $F_2$ overall | 11.048** | 3.354* | .887 | |
| $R^2$ | .075 | .024 | .007 | |
| $\Delta R^2$ | .010 ($p$ <.05) | .012 ($p$ <.05) | .001 (N.S.) | |
| Occupational Prestige (OP) | -.0001 | -.004 | .006 | |
| D-A match | -.355** | -.108 | -.089 | |
| $F_2$ | 14.065** | 2.514 | .947 | |
| $R^2$ | .065 | .011 | .005 | |
| OP x D-A match | -.011* | -.007* | -.004 | |
| $F_2$ overall | 11.355** | 2.948* | .905 | |
| $R^2$ | .078 | .021 | .007 | |
| $\Delta R^2$ | .013 ($p$ <.05) | .010 ($p$ <.05) | .002 (N.S.) | |

[a] PDM = Participation in decision-making

* $p < .05$

** $p < .01$

Table 14.

**Tests of Interactions between the Five Curvilinear Stressors[a] and D-A Match in Predicting Job Stress**

Part A. Tests Using Hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Felt stress | | |
| Step 1: Identity | -.923** | | | |
| (Identity)$^2$ | .102** | | | |
| D-A match | -.078 | 3.607* | .026 | |
| Step 2: Identity x D-A match | .060 | 3.100* | .030 | .004 (N.S.) |
| Step 3: (Identity)$^2$ x D-A match | -.016 | 2.542* | .031 | .001 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Identity | -.619** | | | |
| (Identity)$^2$ | .059* | | | |
| D-A match | -.357** | 20.442** | .133 | |
| Step 2: Identity x D-A match | .046 | 15.762** | .136 | .003 (N.S.) |
| Step 3: (Identity)$^2$ x D-A match | .002 | 12.581** | .136 | .000 (N.S.) |

Part B. Additional Tests Using Non-hypothesized Variables

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: Significance | -1.017** | | | |
| (Significance)$^2$ | .102** | | | |
| D-A match | -.350** | 22.968** | .147 | |
| Step 2: Significance x D-A match | .058 | 17.859** | .152 | .005 (N.S.) |
| Step 3: (Significance)$^2$ x D-A match | -.027 | 14.617** | .155 | .003 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.197* | | | |
| (Incumbent_reported complexity)$^2$ | .133* | | | |
| D-A match | -.325** | 19.747** | .133 | |
| Step 2: | | | | |
| Incumbent_reported complexity x D-A match | -.083 | 15.096** | .136 | .003 (N.S.) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x D-A match | .044 | 12.170** | .137 | .001 (N.S.) |

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: DOT complexity | -.503** | | | |
| $(\text{DOT complexity})^2$ | .044** | | | |
| D-A match | -.316** | 24.521** | .153 | |
| Step 2: DOT complexity x D-A match | -.076** | 20.991** | .173 | .020 ($p$ <.01) |
| Step 3: $(\text{DOT complexity})^2$ x D-A match | .004 | 17.163** | .176 | .003 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: Occupational prestige (OP) | -.047* | | | |
| $(\text{OP})^2$ | .0001* | | | |
| D-A match | -.332** | 20.158** | .130 | |
| Step 2: OP x D-A match | -.008* | 16.252** | .139 | .009 ($p$ <.05) |
| Step 3: $(\text{OP})^2$ x D-A match | -.0001 | 13.055** | .140 | .001 (N.S.) |

[a] Curvilinear stressors = task identity, task significance, incumbent_reported job complexity, DOT job complexity, and occupational prestige. These variables have curvilinear relationships with stress.

* $p < .05$

** $p < .01$

Table 15.

Tests of Interactions between Job Complexity and Working Conditions in Predicting Anxiety, Time Stress, and Felt Stress

| Predictors | Outcomes | | |
|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress |
| Incumbent_reported complexity | -.102 | .108 | .356** |
| Incumbent_reported working conditions | .761** | .606** | .810** |
| $F$ | 19.482** | 15.114** | 25.299** |
| $R^2$ | .092 | .073 | .116 |
| Incumbent_reported complexity x Incumbent_reported working conditions | -.349* | -.003 | -.167 |
| $F_2$ overall | 14.600** | 10.050** | 17.243** |
| $R^2$ | .102 | .073 | .118 |
| $\Delta R^2$ | .010 ($p$ <.05) | .000 (N.S.) | .002 (N.S.) |
| DOT complexity | .005 | .028 | .099** |
| Incumbent_reported working conditions | .761** | .605** | .812** |
| $F$ | 17.892** | 14.998** | 20.833** |
| $R^2$ | .082 | .069 | .094 |
| DOT complexity x Incumbent_reported working conditions | -.053 | .025 | .019 |
| $F_2$ overall | 12.175** | 10.057** | 13.890** |
| $R^2$ | .083 | .070 | .094 |
| $\Delta R^2$ | .001 (N.S.) | .001 (N.S.) | .000 (N.S.) |
| Occupational Prestige (OP) | -.005 | -.003 | .010 |
| Incumbent_reported working conditions | .739** | .569** | .762** |
| $F$ | 18.278** | 14.742** | 18.848** |
| $R^2$ | .083 | .068 | .086 |
| OP x Incumbent_reported working conditions | -.004 | .009 | .007 |
| $F_2$ overall | 12.218** | 10.239** | 12.770** |
| $R^2$ | .084 | .071 | .087 |
| $\Delta R^2$ | .001 (N.S.) | .003 (N.S.) | .001 (N.S.) |
| Incumbent_reported complexity | -.197* | .061 | .233* |
| DOT working conditions | .011 | .195 | -.149 |
| $F$ | 2.322 | 1.799 | 4.808** |
| $R^2$ | .012 | .009 | .024 |
| Incumbent_reported complexity x DOT working conditions | .112 | .124 | .001 |
| $F_2$ overall | 1.693 | 1.453 | 3.197* |
| $R^2$ | .013 | .011 | .024 |
| $\Delta R^2$ | .001 (N.S.) | .002 (N.S.) | .000 (N.S.) |

| Predictors | Outcomes | | |
|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress |
| DOT complexity | -.054 | .005 | .019 |
| DOT working conditions | -.008 | .185 | -.189 |
| $F_2$ | 1.027 | 1.478 | 1.624 |
| $R^2$ | .005 | .007 | .008 |
| DOT complexity x DOT working conditions | -.001 | .022 | -.043 |
| $F_2$ overall | .683 | 1.025 | 1.203 |
| $R^2$ | .005 | .007 | .009 |
| $\Delta R^2$ | .000 (N.S.) | .000 (N.S.) | .000 (N.S.) |
| Occupational Prestige (OP) | -.010 | -.004 | .002 |
| DOT working conditions | -.018 | .149 | -.197 |
| $F_2$ | 1.673 | 1.884 | 1.564 |
| $R^2$ | .008 | .009 | .008 |
| OP x DOT working conditions | -.002 | .004 | -.006 |
| $F_2$ overall | 1.118 | 1.304 | 1.112 |
| $R^2$ | .008 | .010 | .008 |
| $\Delta R^2$ | .000 (N.S.) | .001 (N.S.) | .000 (N.S.) |

* $p < .05$

** $p < .01$

Table 16.

**Tests of Interactions between Job Complexity and Working Conditions in Predicting Exhaustion**

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.509** | | | |
| (Incumbent_reported complexity)$^2$ | .149* | | | |
| Incumbent_reported working conditions | .488** | 18.195** | .124 | |
| Step 2: | | | | |
| Incumbent_reported complexity x Incumbent_reported working conditions | -.133 | 13.915** | .127 | .003 (N.S.) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x Incumbent_reported working conditions | .155 | 11.394** | .130 | .003 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| DOT complexity | -.595** | | | |
| (DOT complexity)$^2$ | .050** | | | |
| Incumbent_reported working conditions | .487** | 21.264** | .138 | |
| Step 2: | | | | |
| DOT complexity x Incumbent_reported working conditions | .012 | 15.928** | .138 | .000 (N.S.) |
| Step 3: | | | | |
| (DOT complexity)$^2$ x Incumbent_reported working conditions | .002 | 12.714** | .138 | .000 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Occupational prestige (OP) | -.062** | | | |
| (OP)$^2$ | .0001** | | | |
| Incumbent_reported working conditions | .523** | 17.107** | .114 | |
| Step 2: | | | | |
| OP x Incumbent_reported working conditions | .006 | 13.018** | .115 | .001 (N.S.) |
| Step 3: | | | | |
| (OP)$^2$ x Incumbent_reported working conditions | .0001 | 10.966** | .121 | .006 (N.S.) |

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.403* | | | |
| (Incumbent_reported complexity)$^2$ | .132* | | | |
| DOT working conditions | .216* | 11.427** | .087 | |
| Step 2: | | | | |
| Incumbent_reported complexity x DOT working conditions | .394** | 11.168** | .104 | .022 ($p$ <.01) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x DOT working conditions | -.113 | 9.033** | .106 | .002 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| DOT complexity | -.635** | | | |
| (DOT complexity)$^2$ | .051** | | | |
| DOT working conditions | .003 | 12.260** | .084 | |
| Step 2: | | | | |
| DOT complexity x DOT working conditions | .007 | 9.176** | .084 | .000 (N.S.) |
| Step 3: | | | | |
| (DOT complexity)$^2$ x DOT working conditions | .032 | 7.590** | .087 | .003 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Occupational prestige (OP) | -.056** | | | |
| (OP)$^2$ | .0001* | | | |
| DOT working conditions | .154 | 7.664** | .054 | |
| Step 2: | | | | |
| OP x DOT working conditions | .001 | 5.739** | .054 | .000 (N.S.) |
| Step 3: | | | | |
| (OP)$^2$ x DOT working conditions | .001 | 4.946** | .059 | .005 (N.S.) |

* $p < .05$

** $p < .01$

Table 17

Sixteen - Group Contrasts of Job Stress based on Combinations of Job Complexity and Working Conditions

Part A. Incumbent_reported Job Complexity and Working Conditions

| Job complexity | | Poor | | Good | | |
|---|---|---|---|---|---|---|
| High | Group | 1 | 2 | 3 | 4 | |
| | N= | 21 | 18 | 34 | 29 | 102 |
| | Group | 5 | 6 | 7 | 8 | |
| | N= | 24 | 25 | 37 | 14 | 100 |
| | Group | 9 | 10 | 11 | 12 | |
| | N= | 28 | 24 | 23 | 22 | 97 |
| Low | Group | 13 | 14 | 15 | 16 | |
| | N= | 41 | 31 | 24 | 20 | 116 |
| | N= | 114 | 98 | 118 | 85 | 415 |

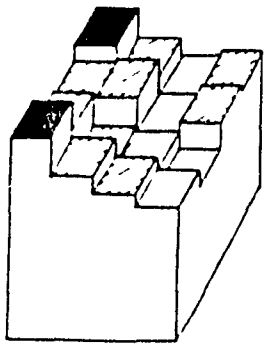
Working conditions

Higher level of stress

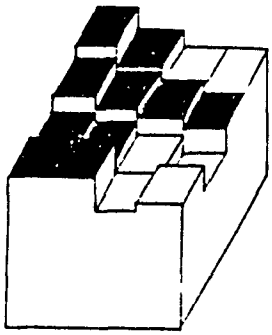
Middle level of stress

Lower level of stress

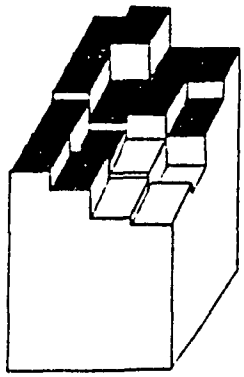
Anxiety



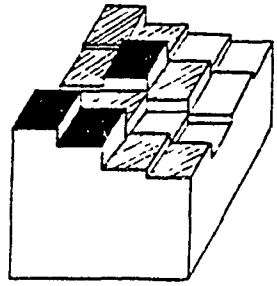
Time stress



Felt stress



Exhaustion



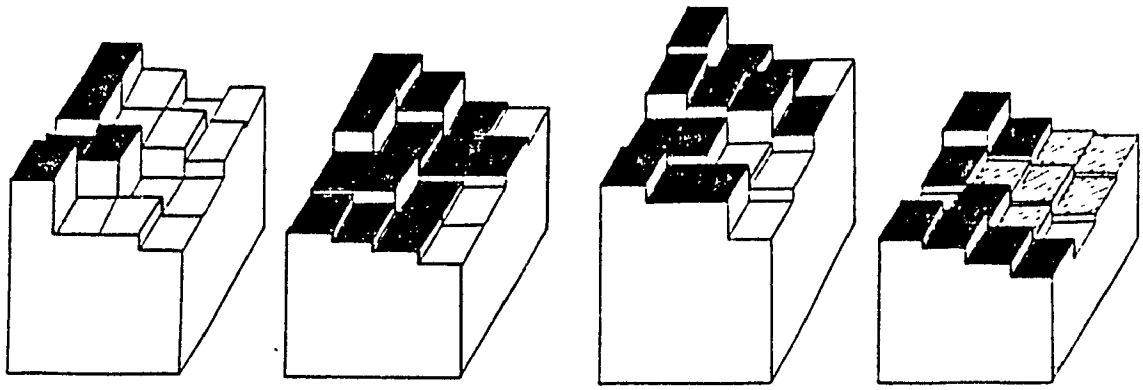
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.20 | 3.56 | 3.16 | 3.38 | 4.01 | 3.42 | 2.97 | 2.97 | 5.06 | 5.31 | 4.39 | 4.36 | 2.85 | 2.45 | 2.27 | 2.13 |
| 3.79 | 3.98 | 3.16 | 3.43 | 3.73 | 3.36 | 3.13 | 2.93 | 5.03 | 4.45 | 4.50 | 4.04 | 2.80 | 3.02 | 2.55 | 2.28 |
| 4.04 | 3.30 | 3.13 | 2.76 | 3.32 | 3.07 | 2.73 | 2.43 | 4.80 | 4.24 | 3.97 | 3.30 | 2.70 | 2.69 | 2.30 | 2.07 |
| 4.77 | 3.92 | 3.47 | 3.23 | 3.59 | 3.56 | 2.76 | 2.96 | 4.81 | 4.41 | 3.81 | 3.76 | 3.58 | 3.19 | 2.60 | 2.44 |

Part B. DOT Measure of Job Complexity and Working Conditions

| Job complexity | | Poor | | | Good | |
|---|---|---|---|---|---|---|
| High | Group | 1 | 2 | 3 | 4 | |
| | N= | 24 | 14 | 33 | 33 | 104 |
| | Group | 5 | 6 | 7 | 8 | |
| | N= | 21 | 23 | 34 | 28 | 106 |
| | Group | 9 | 10 | 11 | 12 | |
| | N= | 32 | 32 | 27 | 12 | 103 |
| Low | Group | 13 | 14 | 15 | 16 | |
| | N= | 37 | 29 | 24 | 12 | 102 |
| | N= | 114 | 98 | 118 | 85 | 415 |

Working conditions

Anxiety Time stress Felt stress Exhaustion



| | | | |
|---|---|---|---|
| 4.33 | 3.70 | 3.05 | 3.20 |
| 4.36 | 3.57 | 3.53 | 3.32 |
| 3.85 | 4.21 | 2.91 | 3.00 |
| 4.57 | 3.30 | 3.34 | 3.04 |

| | | | |
|---|---|---|---|
| 3.96 | 3.54 | 2.92 | 2.76 |
| 3.96 | 3.29 | 3.03 | 3.01 |
| 3.48 | 3.47 | 2.76 | 2.69 |
| 3.36 | 3.22 | 3.00 | 2.70 |

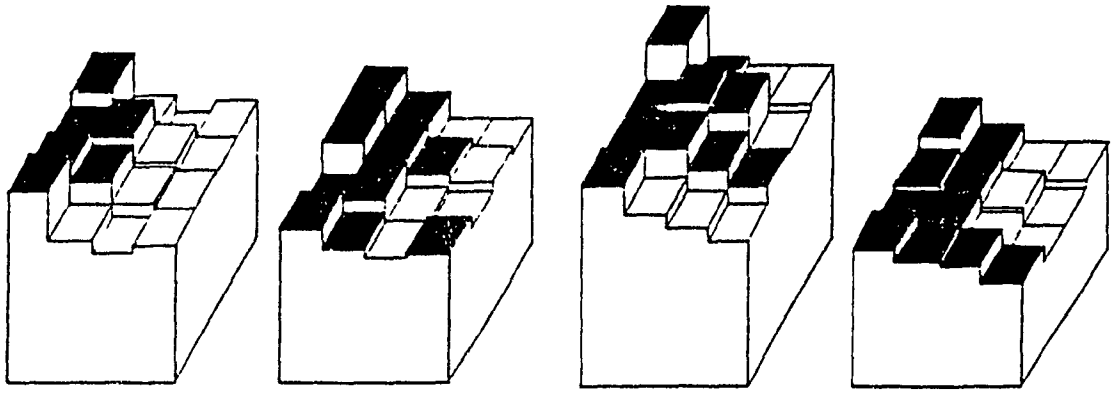
| | | | |
|---|---|---|---|
| 5.36 | 4.52 | 4.04 | 4.03 |
| 5.16 | 4.86 | 4.70 | 4.03 |
| 4.58 | 4.57 | 3.83 | 3.72 |
| 4.73 | 4.28 | 4.26 | 3.36 |

| | | | |
|---|---|---|---|
| 3.26 | 2.63 | 2.30 | 2.27 |
| 2.87 | 2.58 | 2.40 | 2.17 |
| 2.67 | 2.91 | 2.34 | 1.86 |
| 3.39 | 3.23 | 2.75 | 2.52 |

Part C. Occupational Prestige and Working Conditions

| Job complexity | | Poor | | | Good | |
|---|---|---|---|---|---|---|
| High | Group | 1 | 2 | 3 | 4 | |
| | N= | 26 | 15 | 36 | 34 | 111 |
| | Group | 5 | 6 | 7 | 8 | |
| | N= | 27 | 25 | 34 | 22 | 108 |
| | Group | 9 | 10 | 11 | 12 | |
| | N= | 27 | 29 | 29 | 18 | 103 |
| Low | Group | 13 | 14 | 15 | 16 | |
| | N= | 34 | 29 | 19 | 11 | 93 |
| | N= | 114 | 98 | 118 | 85 | 415 |

Working conditions



| Anxiety | | | | Time stress | | | | Felt stress | | | | Exhaustion | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.38 | 3.40 | 2.86 | 3.11 | 3.88 | 3.36 | 2.78 | 2.69 | 5.54 | 4.29 | 3.96 | 3.99 | 3.20 | 2.65 | 2.26 | 2.25 |
| 3.78 | 4.07 | 3.49 | 3.19 | 3.88 | 3.41 | 3.17 | 2.96 | 4.60 | 5.02 | 4.70 | 3.89 | 2.90 | 2.87 | 2.42 | 2.11 |
| 4.31 | 3.88 | 3.44 | 3.26 | 3.08 | 3.45 | 2.83 | 2.74 | 4.67 | 4.76 | 4.26 | 3.96 | 2.65 | 2.90 | 2.35 | 2.10 |
| 4.57 | 3.41 | 3.07 | 3.23 | 3.69 | 3.21 | 2.95 | 3.09 | 4.83 | 4.05 | 3.82 | 3.53 | 3.26 | 3.00 | 2.88 | 2.49 |

Note Group 1 = combination of high job complexity and poor working conditions.
Group 4 = combination of high job complexity and good working conditions.
Group 13 = combination of low job complexity and poor working conditions.
Group 16 = combination of low job complexity and good working conditions

Table 18.

Tests of Interactions between Job Complexity and Perceived Fairness in Predicting Anxiety, Time Stress, and Felt Stress

| Predictors | Outcomes | | |
|---|---|---|---|
| | Anxiety | Time Stress | Felt Stress |
| Incumbent_reported complexity | .040 | .250** | .456** |
| Perceived fairness | -.491** | -.442** | -.416** |
| $F_2$ | 18.434** | 18.536** | 16.308** |
| $R^2$ | .087 | .087 | .077 |
| Incumbent_reported complexity x Perceived fairness | .190* | .215** | .188* |
| $F_2$ overall | 13.250** | 14.913** | 12.269** |
| $R^2$ | .097 | .103 | .087 |
| $\Delta R^2$ | .010 ($p$ <.05) | .016 ($p$ <.01) | .010 ($p$ <.05) |
| DOT complexity | -.008 | .023 | .064 |
| Perceived fairness | -.480** | -.363** | -.273** |
| $F_2$ | 19.056** | 14.369** | 6.324** |
| $R^2$ | .086 | .066 | .030 |
| DOT complexity x Perceived fairness | .082* | .048 | .046 |
| $F_2$ overall | 14.268** | 10.302** | 4.682** |
| $R^2$ | .096 | .071 | .034 |
| $\Delta R^2$ | .010 ($p$ <.05) | .005 (N.S.) | .004 (N.S.) |
| Occupational Prestige (OP) | -.006 | -.003 | .007 |
| Perceived fairness | -.473** | -.347** | -.256** |
| $F_2$ | 19.817** | 14.335** | 5.542** |
| $R^2$ | .089 | .066 | .027 |
| OP x Perceived fairness | .005 | .002 | .001 |
| $F_2$ overall | 13.473** | 9.653** | 3.705* |
| $R^2$ | .091 | .067 | .027 |
| $\Delta R^2$ | .002 (N.S.) | .001 (N.S.) | .000 (N.S.) |

* $p$ <.05

** $p$ <.01

Table 19.

Tests of Interactions between Job Complexity and Perceived Fairness in Predicting Exhaustion

| Predictors | Unstandardized coefficient | F | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Incumbent_reported complexity | -1.199* | | | |
| (Incumbent_reported complexity)$^2$ | .134* | | | |
| Perceived fairness | -.508** | 32.224** | .201 | |
| Step 2: | | | | |
| Incumbent_reported complexity x Perceived fairness | .098 | 24.575** | .204 | .003 (N.S.) |
| Step 3: | | | | |
| (Incumbent_reported complexity)$^2$ x Perceived fairness | -.048 | 19.718** | .205 | .001 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| DOT complexity | -.412** | | | |
| (DOT complexity)$^2$ | .033** | | | |
| Perceived fairness | -.484** | 37.126** | .218 | |
| Step 2: | | | | |
| DOT complexity x Perceived fairness | .040 | 28.439** | .221 | .003 (N.S.) |
| Step 3: | | | | |
| (DOT complexity)$^2$ x Perceived fairness | -.018 | 23.242** | .226 | .005 (N.S.) |
| | Outcome variable: | Exhaustion | | |
| Step 1: | | | | |
| Occupational prestige (OP) | -.040* | | | |
| (OP)$^2$ | .0001 | | | |
| Perceived fairness | -.518** | 35.284** | .209 | |
| Step 2: | | | | |
| OP x Perceived fairness | .002 | 26.489** | .210 | .001 (N.S.) |
| Step 3: | | | | |
| (OP)$^2$ x Perceived fairness | -.0001** | 24.528** | .236 | .026 ($p$ <.01) |

* $p < .05$

** $p < .01$

Table 20

**Sixteen - Group Contrasts of Job Stress based on Combinations of Job Complexity and Perceived Fairness**

Part A. Incumbent_reported Job Complexity and Perceived Fairness

| Job complexity | | Poor | | Good | | |
|---|---|---|---|---|---|---|
| High | Group | 1 | 2 | 3 | 4 | |
| | N= | 8 | 13 | 27 | 54 | 102 |
| | Group | 5 | 6 | 7 | 8 | |
| | N= | 17 | 26 | 18 | 39 | 100 |
| | Group | 9 | 10 | 11 | 12 | |
| | N= | 22 | 37 | 13 | 25 | 97 |
| Low | Group | 13 | 14 | 15 | 16 | |
| | N= | 38 | 50 | 14 | 14 | 116 |
| | N= | 85 | 126 | 72 | 132 | 415 |

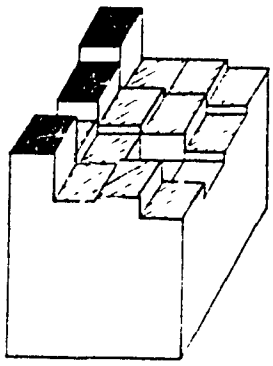
Percieved Fairness

Higher level of stress

Middle level of stress

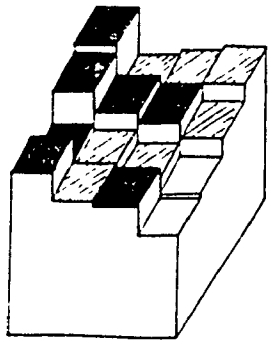
Lower level of stress

Anxiety



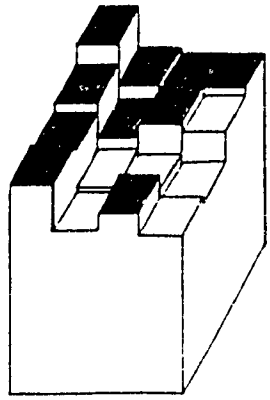
| | | | |
|---|---|---|---|
| 4.68 | 3.58 | 3.45 | 3.34 |
| 4.28 | 3.71 | 3.53 | 3.12 |
| 3.88 | 3.53 | 2.83 | 2.89 |
| 4.76 | 3.70 | 3.75 | 3.32 |

Time stress



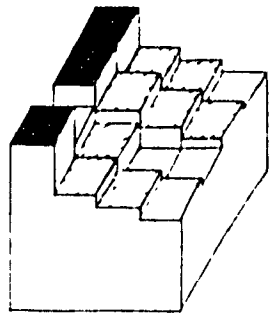
| | | | |
|---|---|---|---|
| 4.19 | 2.98 | 3.19 | 3.23 |
| 3.95 | 3.51 | 3.21 | 2.88 |
| 3.17 | 3.12 | 2.78 | 2.46 |
| 3.86 | 3.19 | 3.11 | 2.40 |

Felt stress



| | | | |
|---|---|---|---|
| 5.63 | 4.09 | 4.59 | 4.58 |
| 5.07 | 4.41 | 4.51 | 4.40 |
| 4.89 | 4.06 | 3.82 | 3.69 |
| 5.02 | 3.93 | 4.27 | 3.79 |

Exhaustion



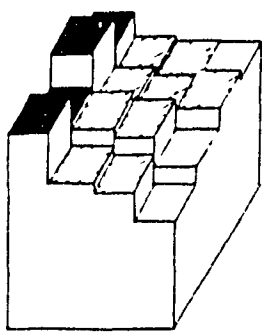
| | | | |
|---|---|---|---|
| 3.42 | 2.69 | 2.38 | 2.17 |
| 3.13 | 2.95 | 2.56 | 2.25 |
| 2.85 | 2.65 | 2.07 | 2.01 |
| 4.01 | 2.77 | 2.46 | 2.21 |

Part B. DOT Measure of Job Complexity and Perceived Fairness

| Job complexity | | Poor | | | Good | |
|---|---|---|---|---|---|---|
| High | Group | 1 | 2 | 3 | 4 | |
| | N = | 20 | 31 | 15 | 38 | 104 |
| | Group | 5 | 6 | 7 | 8 | |
| | N = | 11 | 23 | 27 | 45 | 106 |
| | Group | 9 | 10 | 11 | 12 | |
| | N = | 17 | 37 | 18 | 31 | 103 |
| | Group | 13 | 14 | 15 | 16 | |
| Low | N = | 37 | 35 | 12 | 18 | 102 |
| | N = | 85 | 126 | 72 | 132 | 415 |

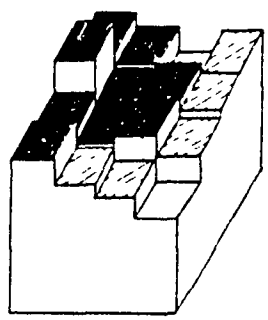
Perceived Fairness

Anxiety



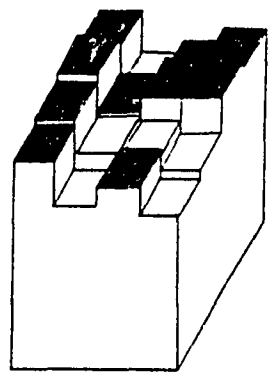
| | | | |
|---|---|---|---|
| 4.04 | 3.47 | 3.30 | 3.28 |
| 4.84 | 3.66 | 3.38 | 3.51 |
| 4.01 | 3.95 | 3.65 | 2.98 |
| 4.70 | 3.47 | 3.29 | 2.58 |

Time stress



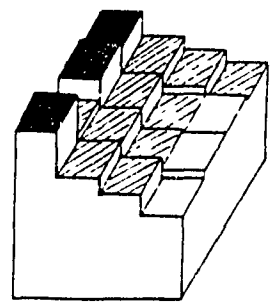
| | | | |
|---|---|---|---|
| 3.64 | 3.27 | 2.74 | 3.04 |
| 4.36 | 3.22 | 3.29 | 3.01 |
| 3.52 | 3.23 | 3.36 | 2.88 |
| 3.71 | 3.14 | 2.78 | 2.33 |

Felt stress



| | | | |
|---|---|---|---|
| 5.02 | 4.02 | 4.22 | 4.44 |
| 5.27 | 4.39 | 4.62 | 4.63 |
| 5.12 | 4.30 | 4.13 | 3.89 |
| 4.99 | 3.93 | 4.36 | 3.72 |

Exhaustion



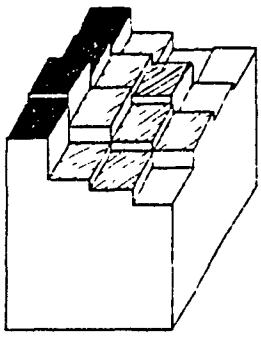
| | | | |
|---|---|---|---|
| 3.27 | 2.66 | 2.50 | 2.12 |
| 3.45 | 2.68 | 2.28 | 2.24 |
| 2.96 | 2.77 | 2.36 | 2.20 |
| 3.99 | 2.87 | 2.51 | 2.02 |

Part C. Occupational Prestige and Perceived Fairness

| Job complexity | | Poor | | | Good | |
|---|---|---|---|---|---|---|
| High | Group | 1 | 2 | 3 | 4 | |
| | N= | 23 | 30 | 23 | 35 | 111 |
| | Group | 5 | 6 | 7 | 8 | |
| | N= | 17 | 32 | 17 | 42 | 108 |
| | Group | 9 | 10 | 11 | 12 | |
| | N= | 15 | 32 | 23 | 33 | 103 |
| | Group | 13 | 14 | 15 | 16 | |
| Low | N= | 30 | 32 | 9 | 22 | 93 |
| | N= | 85 | 126 | 72 | 132 | 415 |

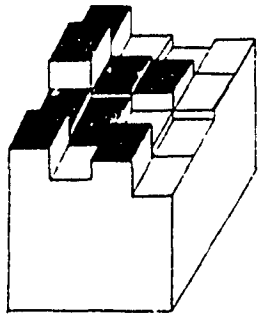
Percieved Fairness

Anxiety



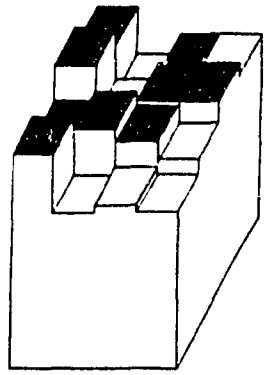
| | | | |
|---|---|---|---|
| 4.09 | 3.33 | 3.09 | 3.14 |
| 4.26 | 3.78 | 3.74 | 3.23 |
| 4.75 | 3.89 | 3.54 | 3.34 |
| 4.62 | 3.56 | 3.33 | 2.98 |

Time stress



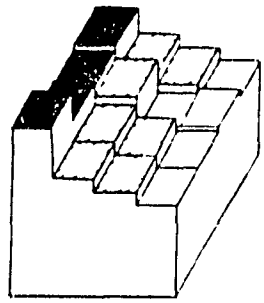
| | | | |
|---|---|---|---|
| 3.60 | 3.00 | 2.78 | 3.00 |
| 4.11 | 3.42 | 3.39 | 3.02 |
| 3.36 | 3.28 | 3.03 | 2.72 |
| 3.84 | 3.15 | 3.58 | 2.74 |

Felt stress



| | | | |
|---|---|---|---|
| 5.04 | 3.94 | 4.35 | 4.31 |
| 5.39 | 4.18 | 4.57 | 4.58 |
| 4.56 | 4.74 | 4.45 | 4.14 |
| 5.13 | 3.71 | 3.93 | 3.84 |

Exhaustion



| | | | |
|---|---|---|---|
| 3.33 | 2.57 | 2.39 | 2.06 |
| 3.25 | 2.89 | 2.21 | 2.23 |
| 3.30 | 2.75 | 2.47 | 2.19 |
| 4.00 | 2.78 | 2.47 | 2.20 |

Note. Group 1 = combination of high job complexity and perceived unfairness;
Group 4 = combination of high job complexity and perceived fairness;
Group 13 = combination of low job complexity and perceived unfairness;
Group 16 = combination of low job complexity and perceived fairness.

Table 21.

Hierarchical Regressions Predicting Job Stress from Job Characteristics and Role Ambiguity

| | Predictors | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $R^2$ for equations using job characteristics as predictors | | | | | | | |
| Outcomes | Variety | Identity | Significance | Autonomy | Feedback | Responsibility | PDM | $R^2$ for equations using role ambiguity as predictor |
| Anxiety | 002(000) | 010(002) | 004(000) | 018(006) | 012(000) | 000(003) | 011(002) | 051 |
| Time stress | 004(007) | 001(001) | 000(001) | 005(000) | 009(000) | 018(028)** | 000(003) | 039 |
| Felt stress | 038(046)** | | 014(026)** | 005(014)* | 004(021)** | 028(039)** | 001(005) | 028 |
| Exhaustion | 041(028)** | | | 078(042)** | 038(004) | 002(000) | 027(007) | 098 |

| | $R^2$ for equations using job characteristics and role ambiguity as predictors | | | | | | |
|---|---|---|---|---|---|---|---|
| Outcomes | Variety RA | Identity RA | Significance RA | Autonomy RA | Feedback RA | Responsibility RA | PDM RA |
| Anxiety | 051(049)** | 054(044)** | 050(046)** | 057(039)** | 051(039)* | 056(056)** | 054(043)** |
| Time stress | 045(041)** | 038(037)** | 038(038)** | 038(033)** | 038(029)** | 066(048)** | 041(041)** |
| Felt stress | 073(035)** | | 053(039)** | 042(037)** | 048(044)** | 066(038)** | 032(031)** |
| Exhaustion | 125(084)** | | | 139(061)** | 101(063)** | 098(096)** | 104(077)** |

Note: The figures in the brackets on the top portion of the table are increases in $R^2$ by adding the job characteristics to the role ambiguity-job stress equation; the figures in the brackets on the bottom portion of the table are increases in $R^2$ by adding role ambiguity to the job characteristics-job stress equations; decimals omitted for all figures; PDM = participation in decision-making; RA = role ambiguity.

* $p < .05$ for $R^2$ increase; ** $p < .01$ for $R^2$ increase.

Table 22.

Hierarchical Regressions Predicting Felt Stress and Exhaustion from Task Identity, Task Significance, and Role Ambiguity

| | Predictors | | |
|---|---|---|---|
| | $R^2$ for equations using job characteristics as predictors | | |
| Outcomes | $(\text{Identity})^2$<br>Identity | $(\text{Significance})^2$<br>Significance | $R^2$ for equations using role ambiguity as predictor |
| Felt stress | 024(032)** | | 028 |
| Exhaustion | 032(022)** | 056(050)** | 098 |
| | $R^2$ for equations using job characteristics and role ambiguity as predictors | | |
| Outcomes | $(\text{Identity})^2$<br>Identity<br>RA | $(\text{Significance})^2$<br>Significance<br>RA | |
| Felt stress | 058(034)** | | |
| Exhaustion | 116(084)** | 143(087)** | |

Note: Task identity has a curvilinear relationship with felt stress and exhaustion. Task significance has a curvilinear relationship with exhaustion. The tests of the mediating effects of role ambiguity in relationships of identity-felt stress, identity-exhaustion, and significance-exhaustion were based on controlling of the curvilinear effects.

* $p < .05$ for $R^2$ increase.
** $p < .01$ for $R^2$ increase.

Table 23.

Hierarchical Regressions Predicting Job Stress from Job Characteristics and Role Conflict

| | Predictors | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $R^2$ for equations using job characteristics as predictors | | | | | | | |
| Outcomes | Variety | Identity | Significance | Autonomy | Feedback | Responsibility | PDM | $R^2$ for equations using role conflict as predictor |
| Anxiety | 002(002) | 010(000) | 004(002) | 018(007) | 012(000) | 000(001) | 011(006) | 196 |
| Time stress | 004(004) | 000(003) | 000(000) | 005(000) | 009(000) | 018(008) | 000(000) | 144 |
| Felt stress | 038(038)** | | 014(017)** | 005(012)* | 004(020)** | 028(018)** | 001(002) | 091 |
| Exhaustion | 041(040)** | | | 078(053)** | 038(009)* | 002(003) | 027(019)** | 158 |

| | $R^2$ for equations using job characteristics and role conflict as predictors | | | | | | |
|---|---|---|---|---|---|---|---|
| Outcomes | Variety RC | Identity RC | Significance RC | Autonomy RC | Feedback RC | Responsibility RC | PDM RC |
| Anxiety | 196(194)** | 197(187)** | 195(191)** | 201(183)** | 194(182)** | 201(201)** | 202(191)** |
| Time stress | 146(142)** | 144(143)** | 140(140)** | 142(137)** | 142(133)** | 149(131)** | 146(146)** |
| Felt stress | 128(090)** | | 107(093)** | 102(097)** | 110(106)** | 104(076)** | 097(096)** |
| Exhaustion | 197(156)** | | | 210(132)** | 166(128)** | 161(159)** | 179(152)** |

Note: The figures in the brackets on the top portion of the table are increases in $R^2$ by adding the job characteristics to the role conflict-job stress equation; the figures in the brackets on the bottom portion of the table are increases in $R^2$ by adding role conflict to the job characteristics-job stress equations; decimals omitted for all figures; PDM = participation in decision-making; RC = role conflict.

* $p < .05$ for $R^2$ increase; ** $p < .01$ for $R^2$ increase.

Table 24.

Hierarchical Regressions Predicting Felt Stress and Exhaustion from Task Identity, Task Significance, and Role Conflict

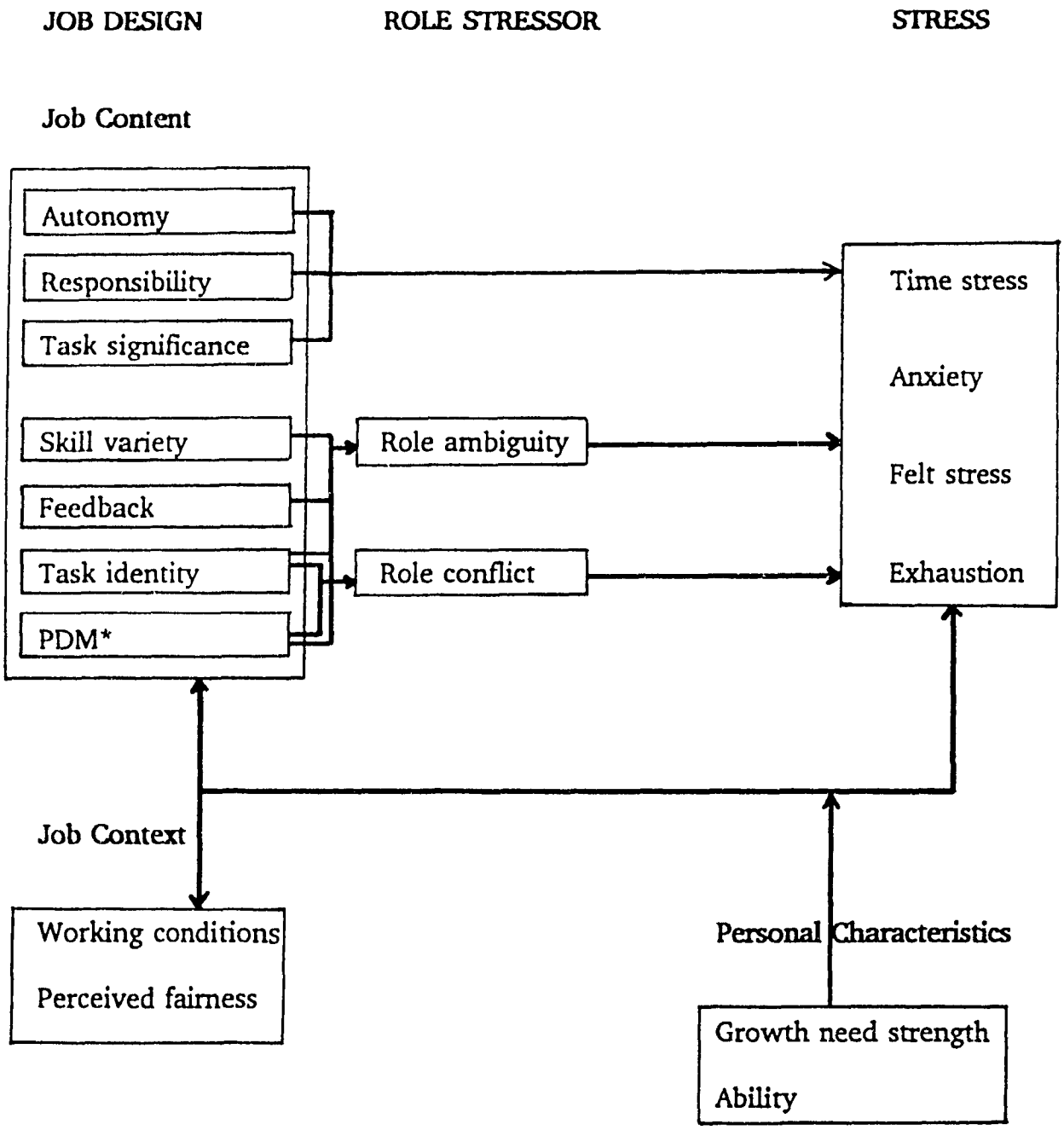
| | Predictors | | |
|---|---|---|---|
| | $R^2$ for equations using job characteristics as predictors | | |
| Outcomes | (Identity)$^2$<br>Identity | (Significance)$^2$<br>Significance | $R^2$ for equations using role conflict as predictor |
| Felt stress | 024(038)** | | 091 |
| Exhaustion | 032(019)** | 056(067)** | 158 |
| | $R^2$ for equations using job characteristics and role conflict as predictors | | |
| Outcomes | (Identity)$^2$<br>Identity<br>RC | (Significance)$^2$<br>Significance<br>RC | |
| Felt stress | 130(106)** | | |
| Exhaustion | 179(147)** | 226(170)** | |

Note: Task identity has a curvilinear relationship with felt stress and exhaustion. Task significance has a curvilinear relationship with exhaustion. The tests of the mediating effects of role conflict in relationships of identity-felt stress, identity-exhaustion, and significance-exhaustion were based on controlling of the curvilinear effects.

* $p < .05$ for $R^2$ increase.
** $p < .01$ for $R^2$ increase.

Figure 1.

Proposed Model of Job Design and Job Stress




* PDM=Participation in decision-making.

Figure 2.

Curvilinear Relationship between Job Design Variables and Job Stress

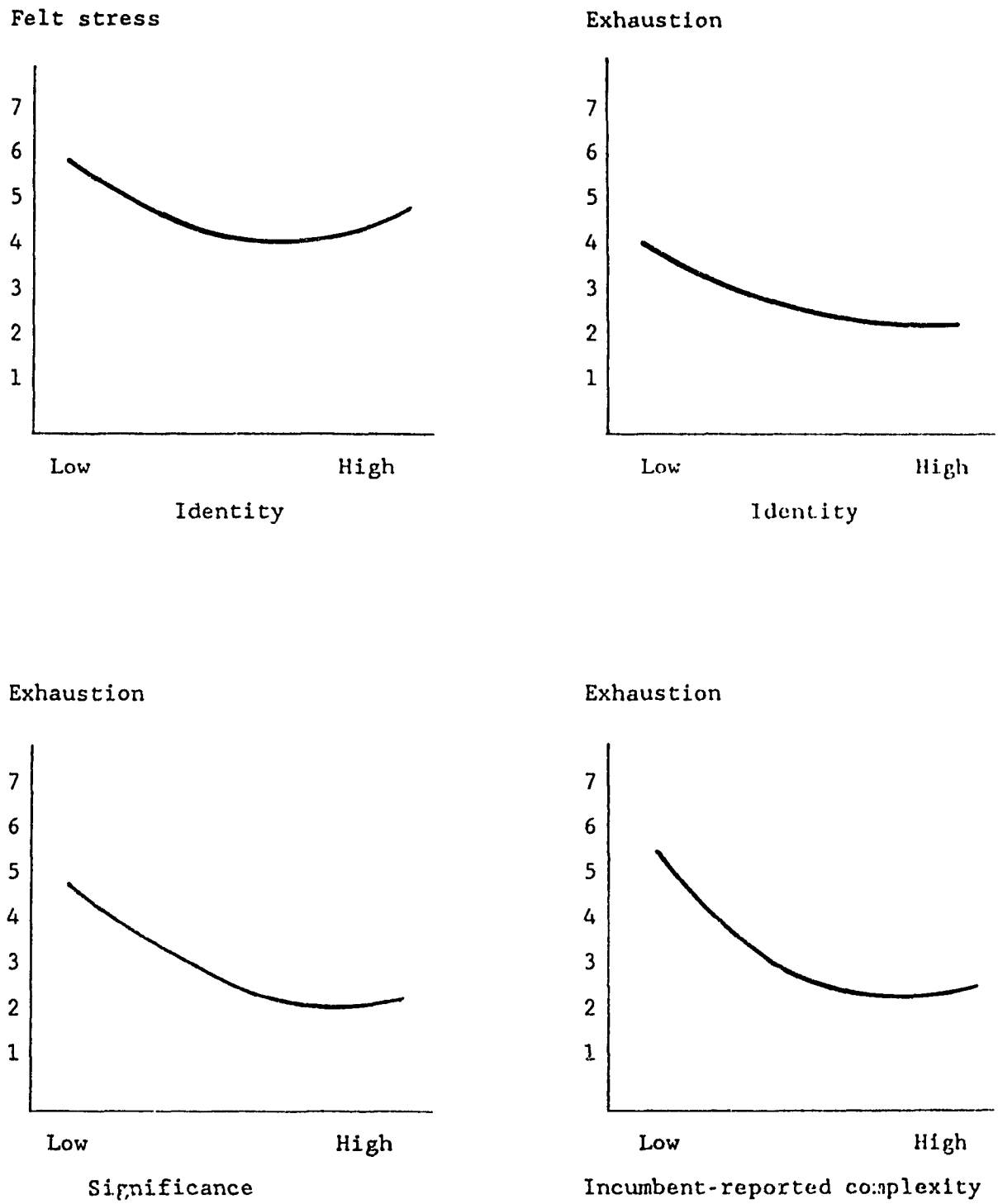
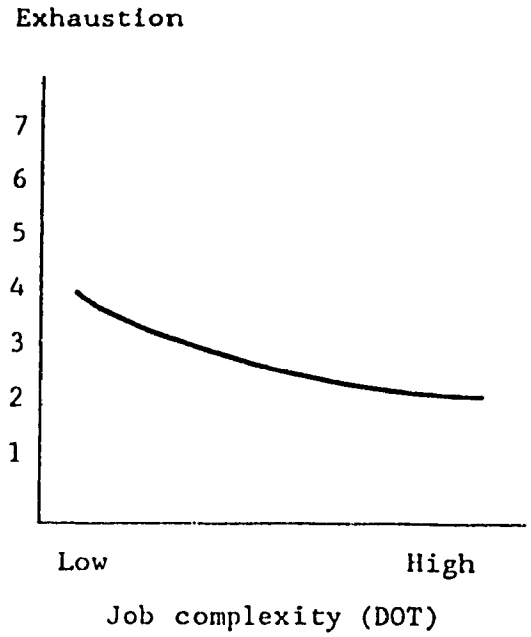


Figure 2. (continued)



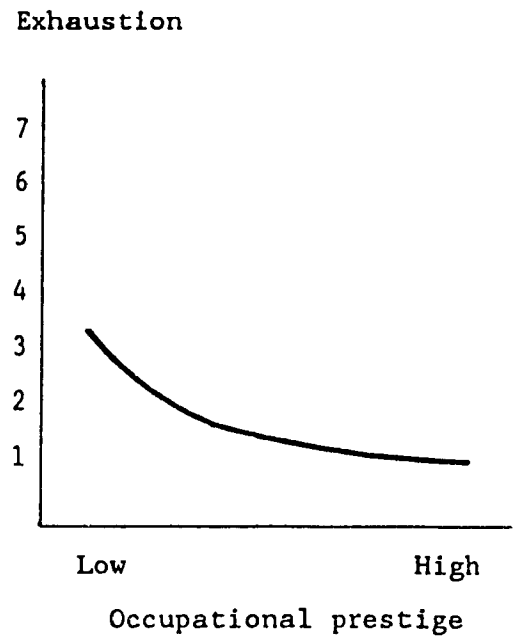
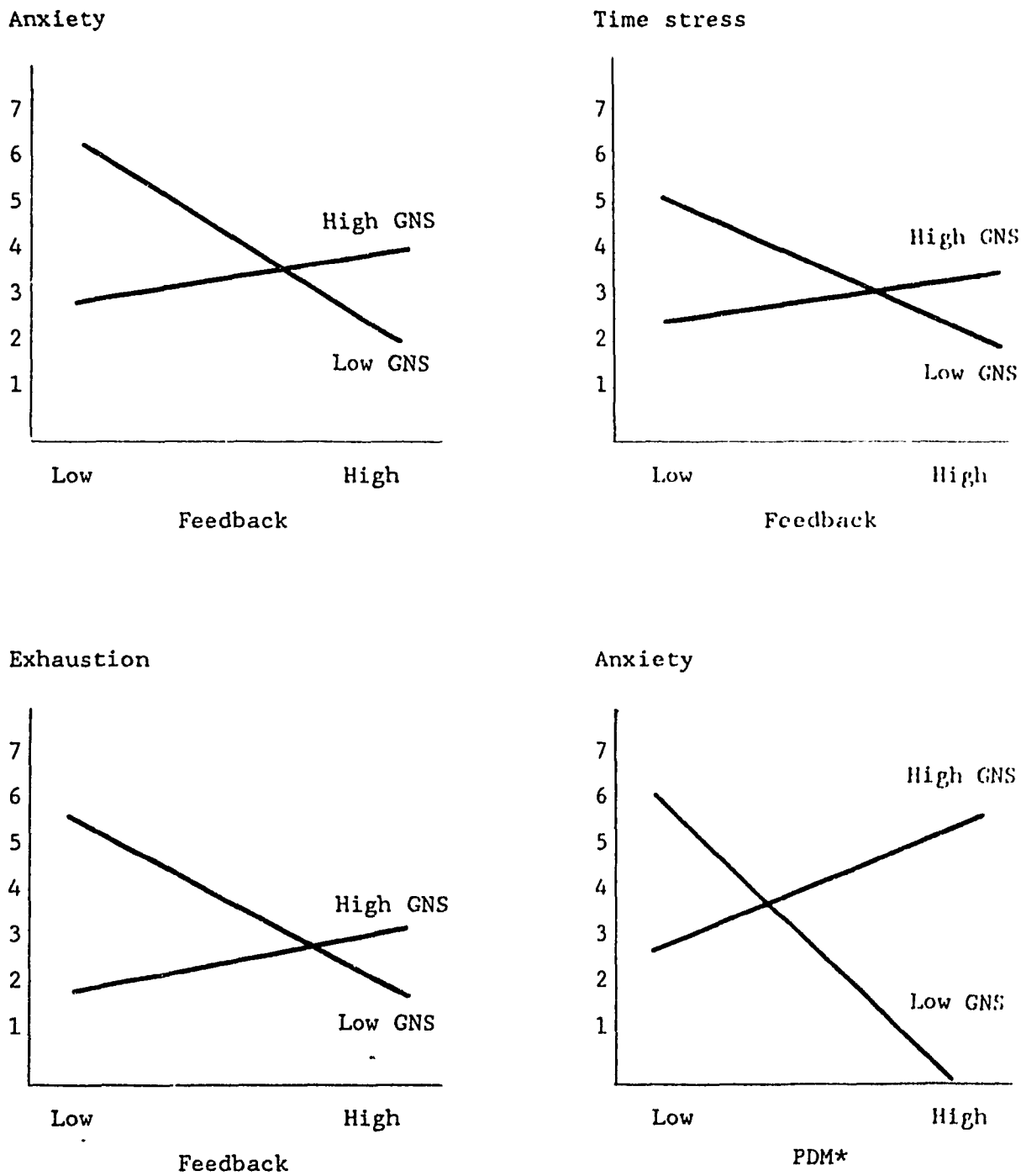



Figure 3.

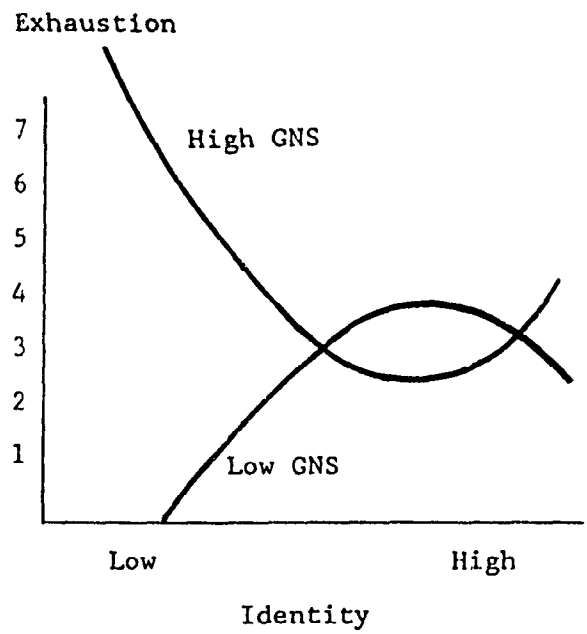
Interactions between Job Characteristics and Growth Need Strength (GNS) on Job Stress




* PDM = Participation in decision-making.

Figure 4.

Interaction between Task Identity and Growth Need Strength (GNS) on Exhaustion*




* Task identity has a curvilinear relationship with exhaustion. The test of the interactive effects between task identity and GNS on exhaustion used the following regression:

$$\text{Exhaustion} = \text{Identity} + (\text{Identity})^2 + \text{GNS} + \text{Identity} \times \text{GNS} + (\text{Identity})^2 \times \text{GNS}$$

Figure 5.

Interactions between Job Characteristics and S-V Match on Job Stress

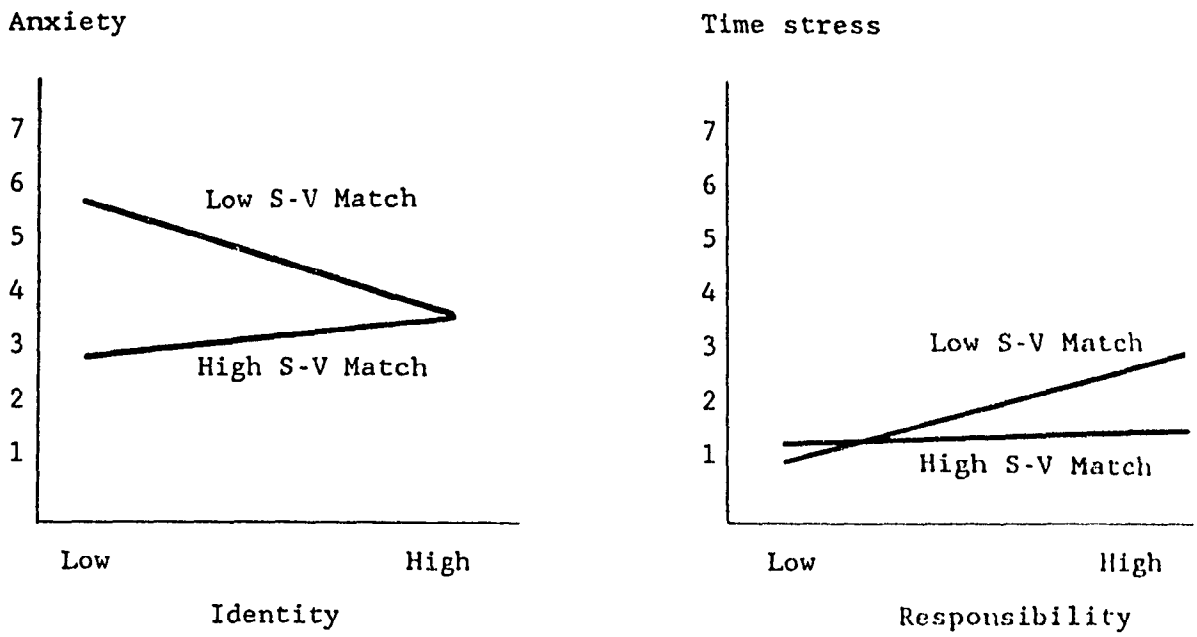
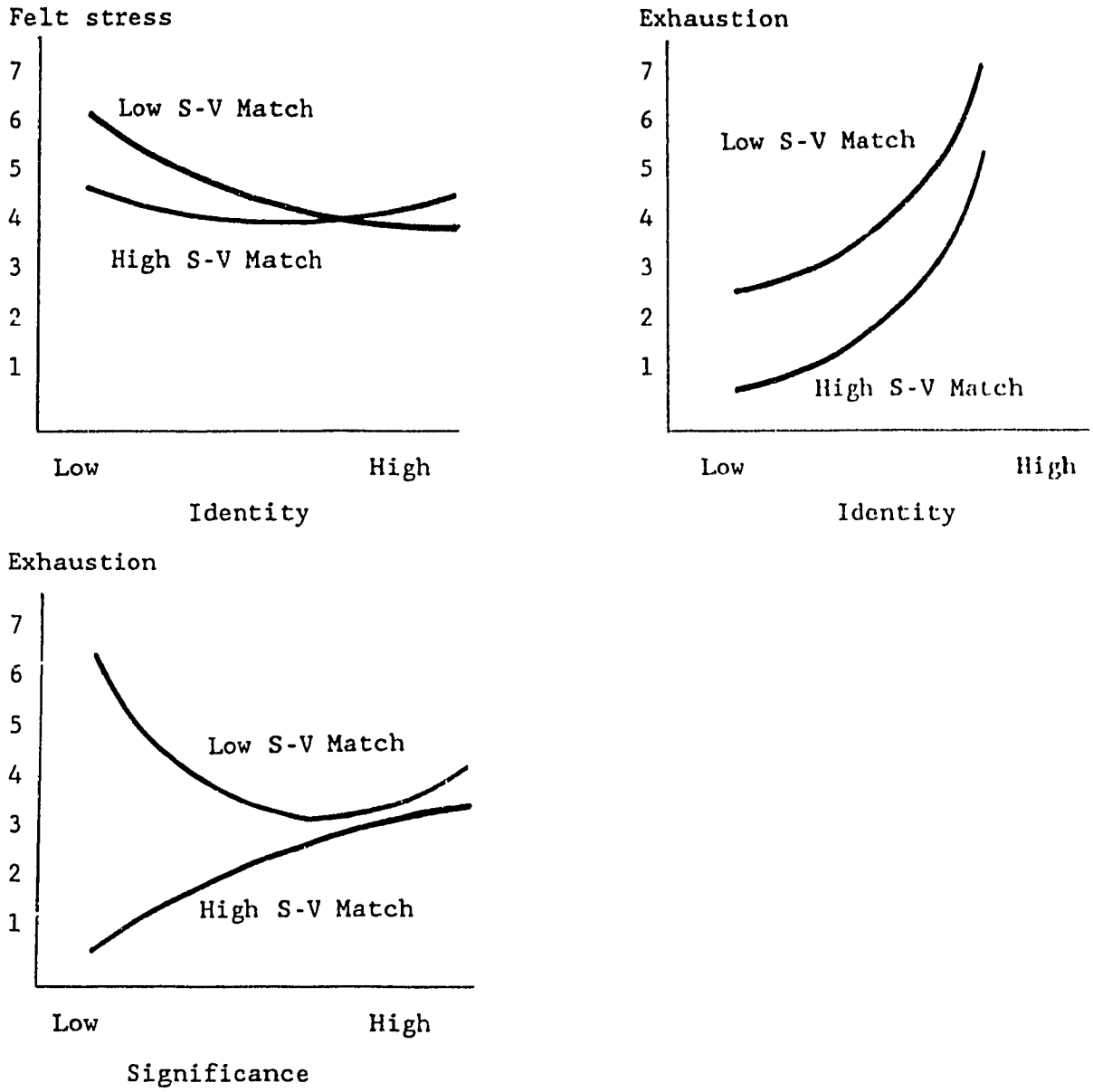


Figure 6.

Interactions between Task Identity and S-V Match and between Task Significance and S-V Match on Job Stress*

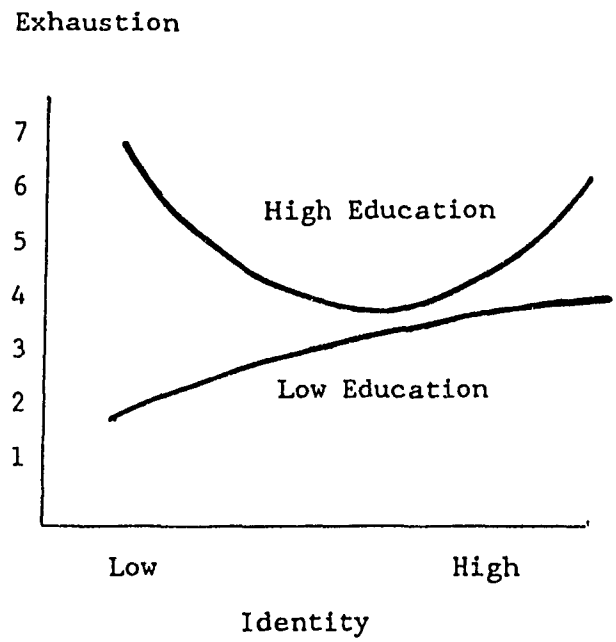



* Task identity has a curvilinear relationship with felt stress and exhaustion. Task significance has a curvilinear relationship with exhaustion. The tests of the interactions between these job characteristics and S-V match on felt stress and exhaustion used the following regression:

$$\text{Stress} = \text{Predictor} + (\text{Predictor})^2 + \text{Moderator} + \text{Predictor} \times \text{Moderator} + (\text{Predictor})^2 \times \text{Moderator}$$

Figure 7.

Interaction between Task Identity and Education on Exhaustion*




* Task identity has a curvilinear relationship with exhaustion. The test of the moderator effects of education on identity-exhaustion relationship used the following regression:

$$\text{Exhaustion} = \text{Identity} + (\text{Identity})^2 + \text{Education} + \text{Identity} \times \text{Education} + (\text{Identity})^2 \times \text{Education}$$

Figure 8.

Interactions between Job Complexity and Education on Felt Stress

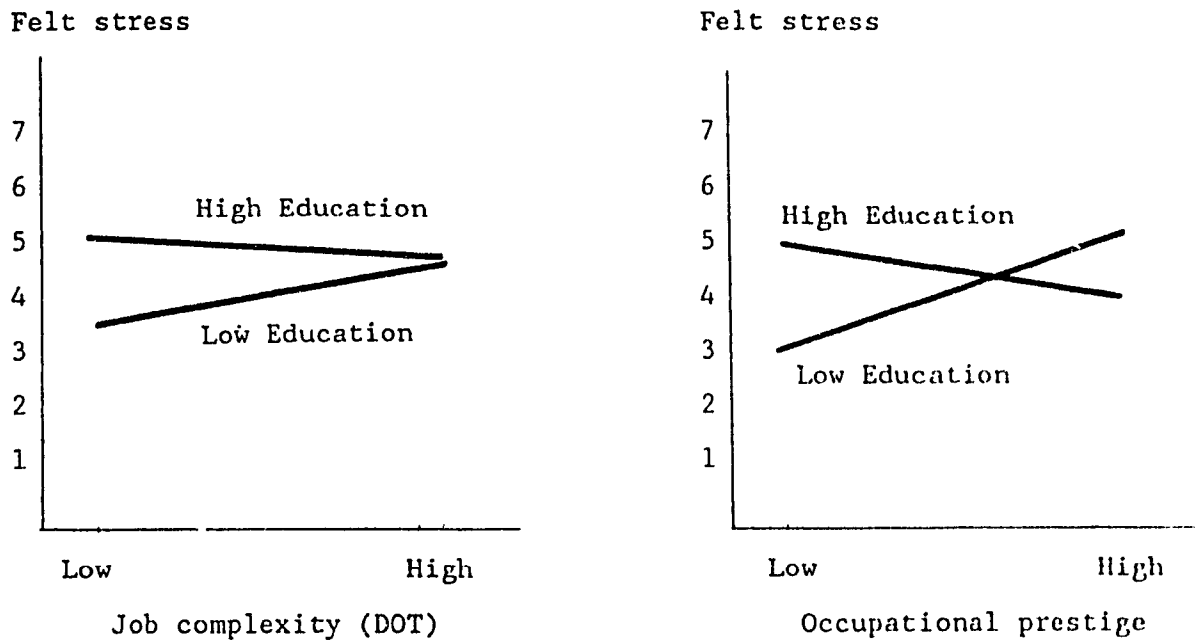
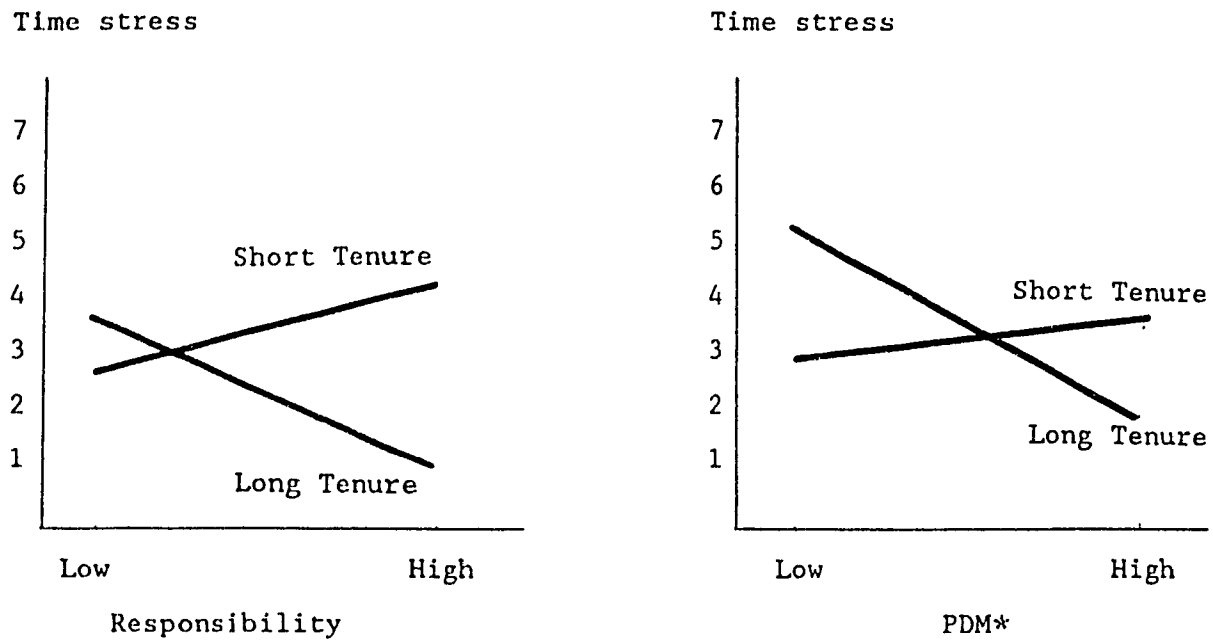


Figure 9.

Interactions between Job Characteristics and Tenure[a] on Time Stress




[a] Tenure - years of working experience on the same line of job.

* PDM - Participation in decision-making.

Figure 10.

Interactions between Job Design Variables and D-A Match on Job Stress

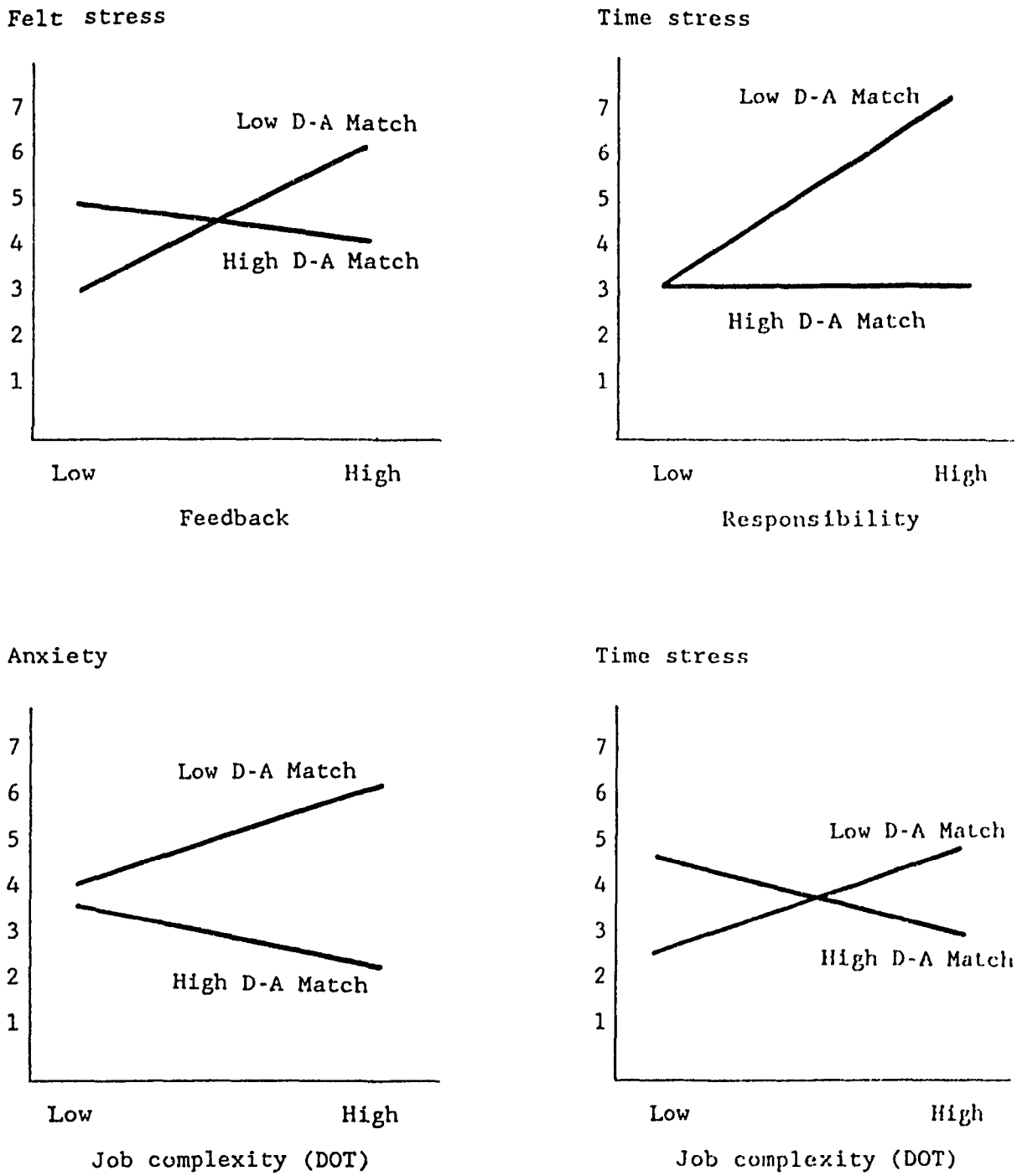


Figure 10. (continued)

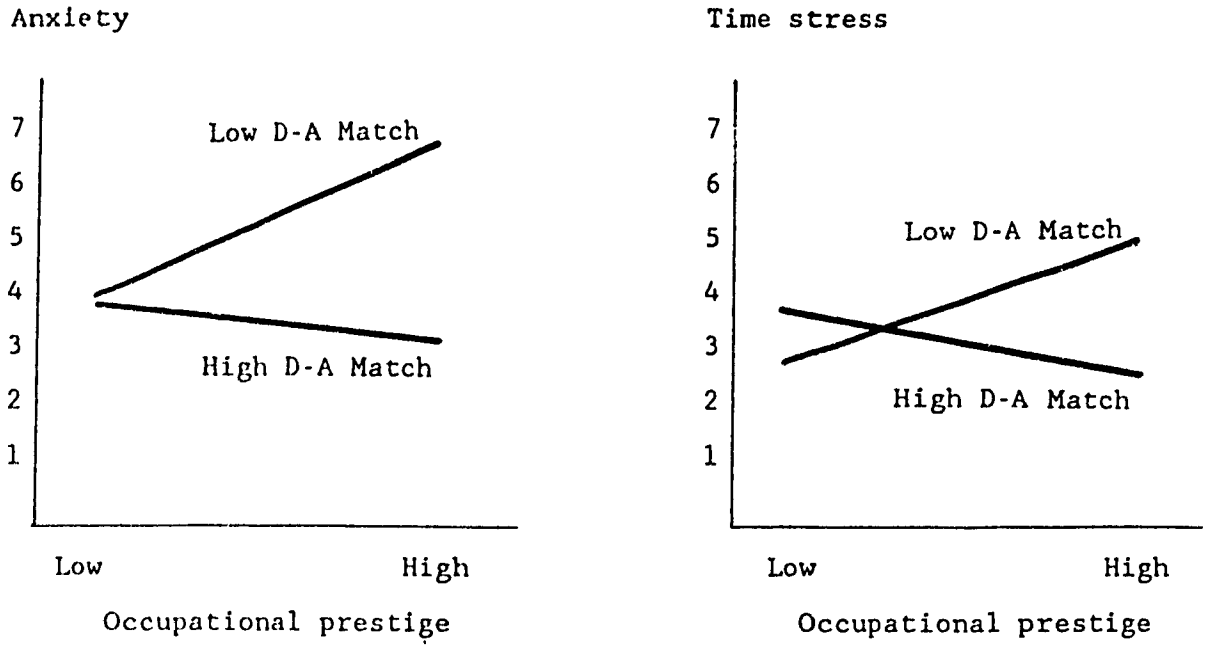
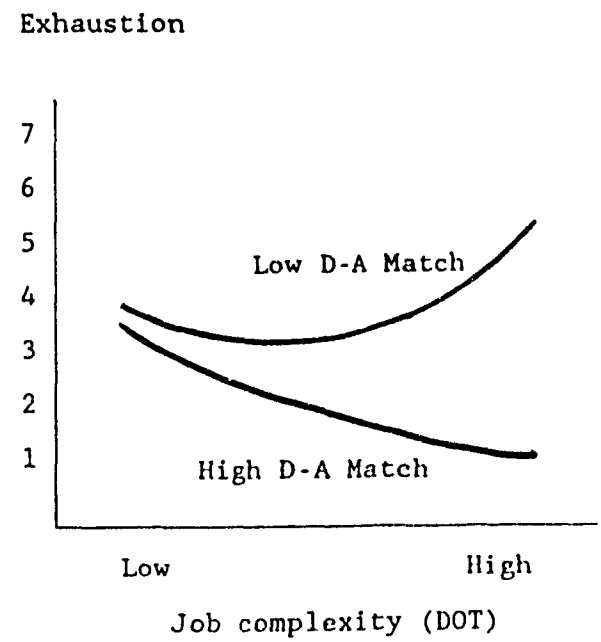
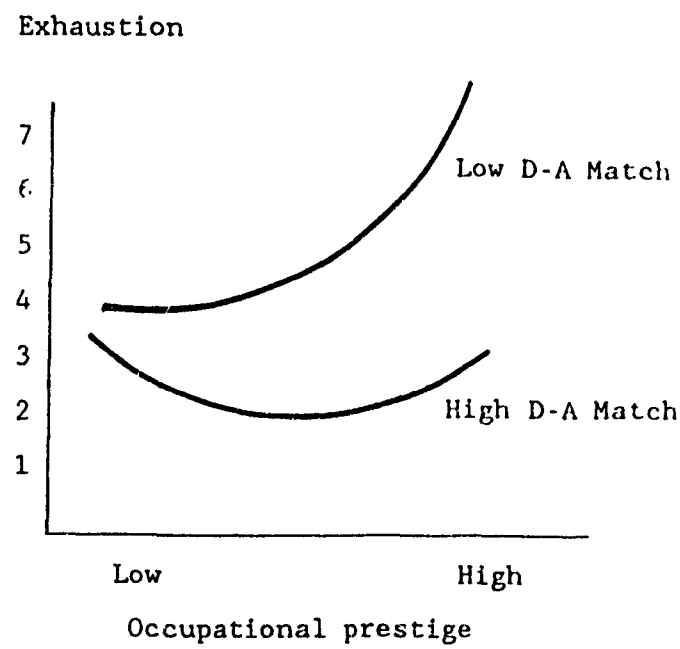


Figure 11.

Interactions between Job Complexity and D-A Match on Exhaustion*



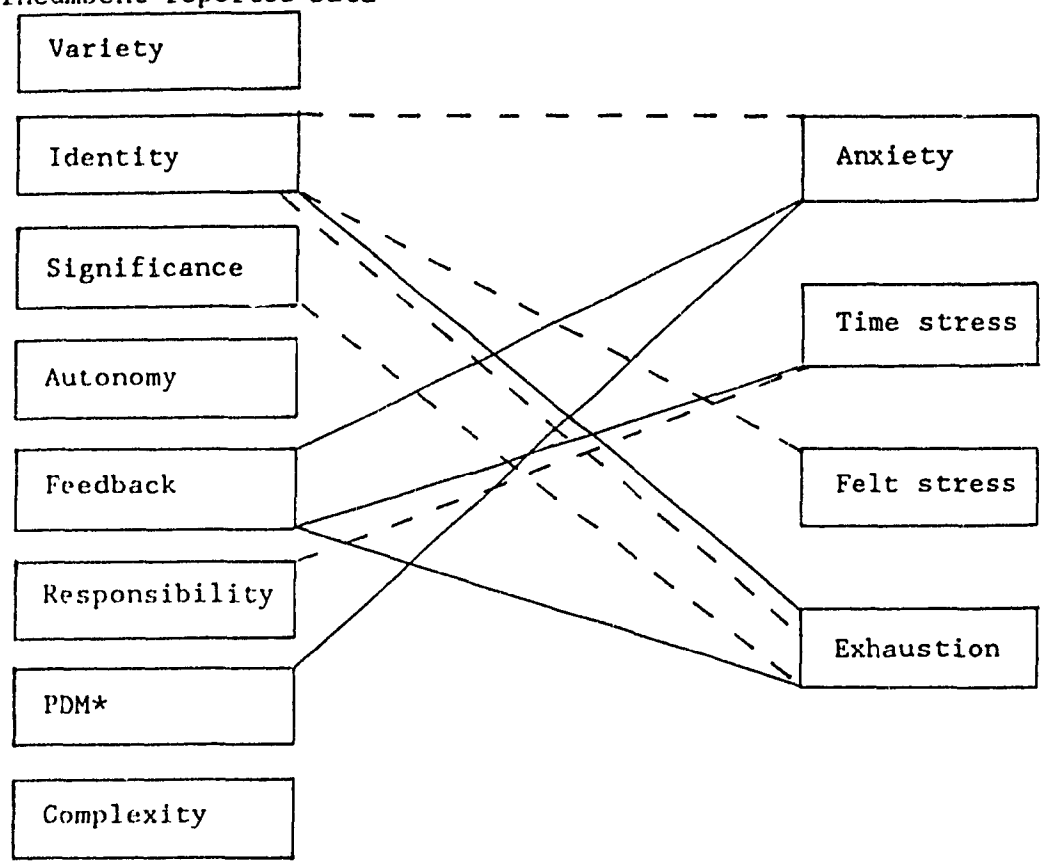

* DOT measure job complexity and occupational prestige have a curvilinear relationship with exhaustion. The tests of the interactions between these two variables and D-A match on exhaustion used the following regression:

$$\text{Stress} = \text{Predictor} + (\text{Predictor})^2 + \text{Moderator} + \text{Predictor} \times \text{Moderator} + (\text{Predictor})^2 \times \text{Moderator}$$

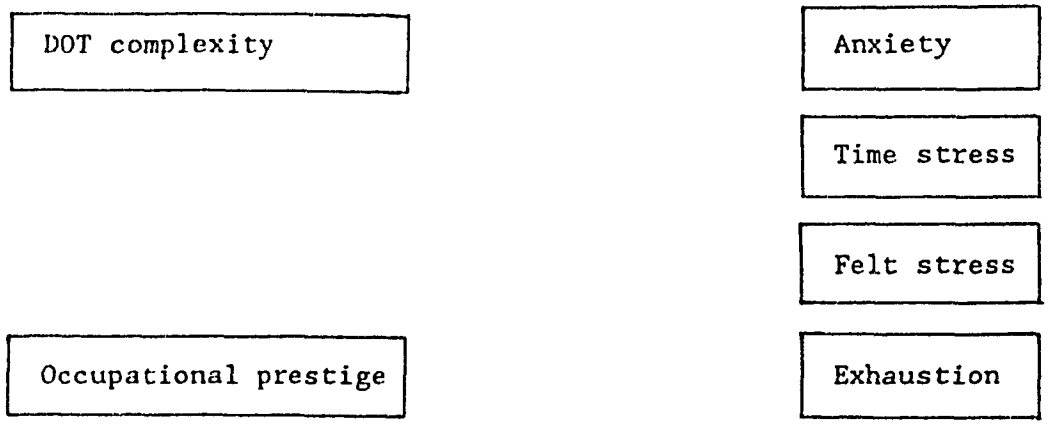
Figure 12.

Statistically Significant Moderator Effects Reported in the Tests of S-V Fit

A. Incumbent-reported Data




B. Nonincumbent Measures




——————— Growth need strength

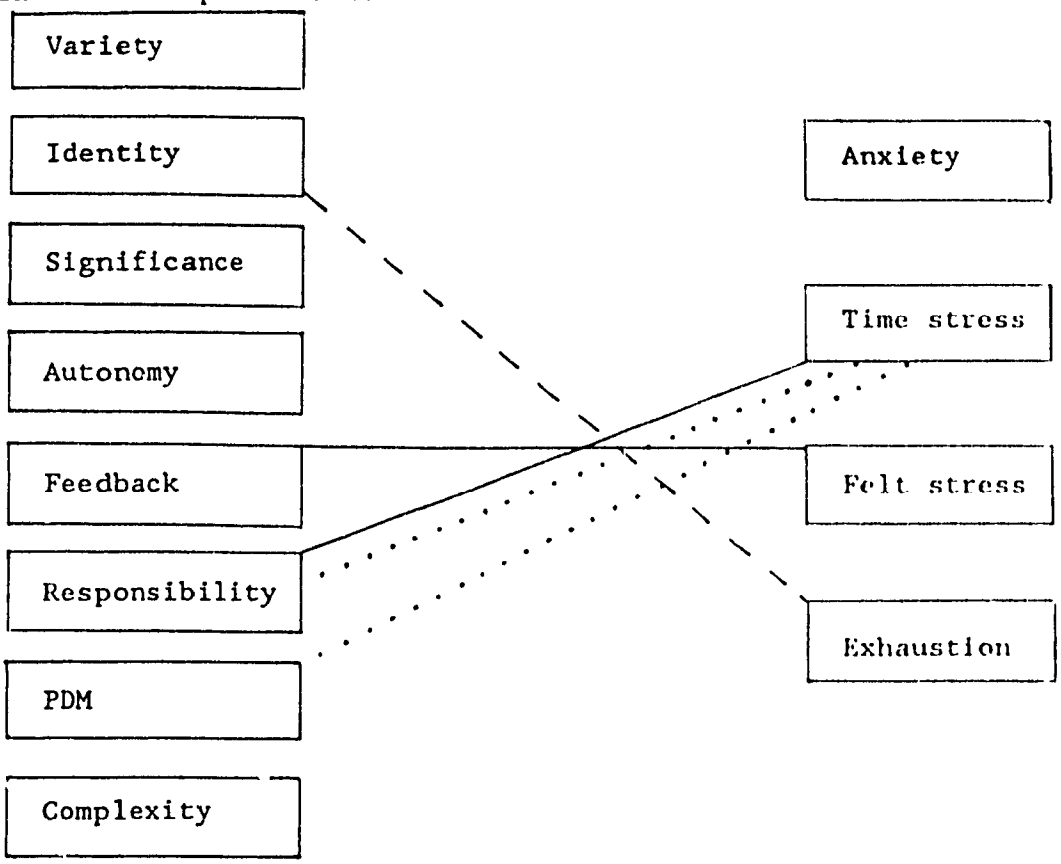
— — — — — — S-V match

*PDM = Participation in decision-making.

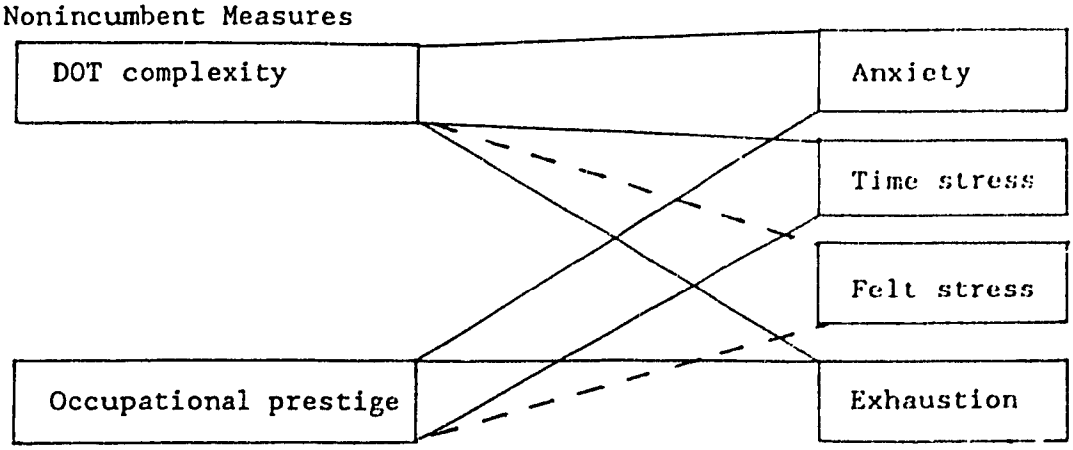
Figure 13.

Statistically Significant Moderator Effects Reported in the Tests of D-A Fit

A. Incumbent-reported Data




B. Nonincumbent Measures




——————— D-A match

— — — — — — Education

. . . . . Tenure*



*Tenure = years of working experience on the same line of job.

Figure 14.

Interaction between Incumbent-reported Job Complexity and Incumbent-reported Working Conditions on Anxiety

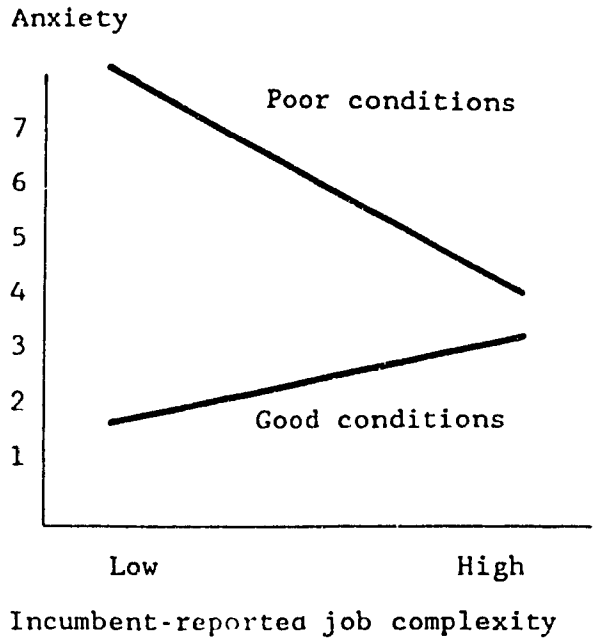
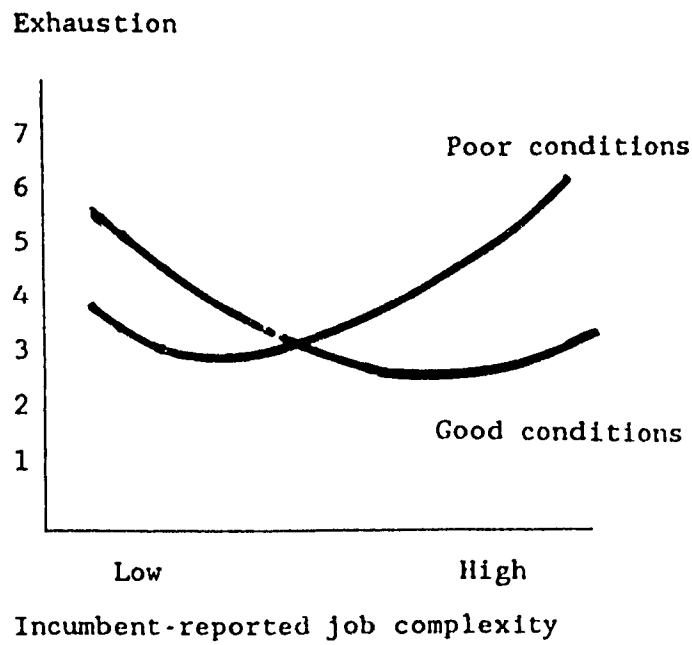


Figure 15.

Interaction between Incumbent-reported Job Complexity and DOT Measure of Working Conditions on Exhaustion*




* Incumbent-reported job complexity has a curvilinear relationship with exhaustion. The test of the interaction between this variable and physical working conditions on exhaustion used the following regression:

$$\text{Exhaustion} = \text{Complexity} + (\text{Complexity})^2 + \text{Conditions} + \text{Complexity} \times \text{Conditions} + (\text{Complexity})^2 \times \text{Conditions}$$

Figure 16.

Interactions between Job Complexity and Perceived Fairness on Job Stress

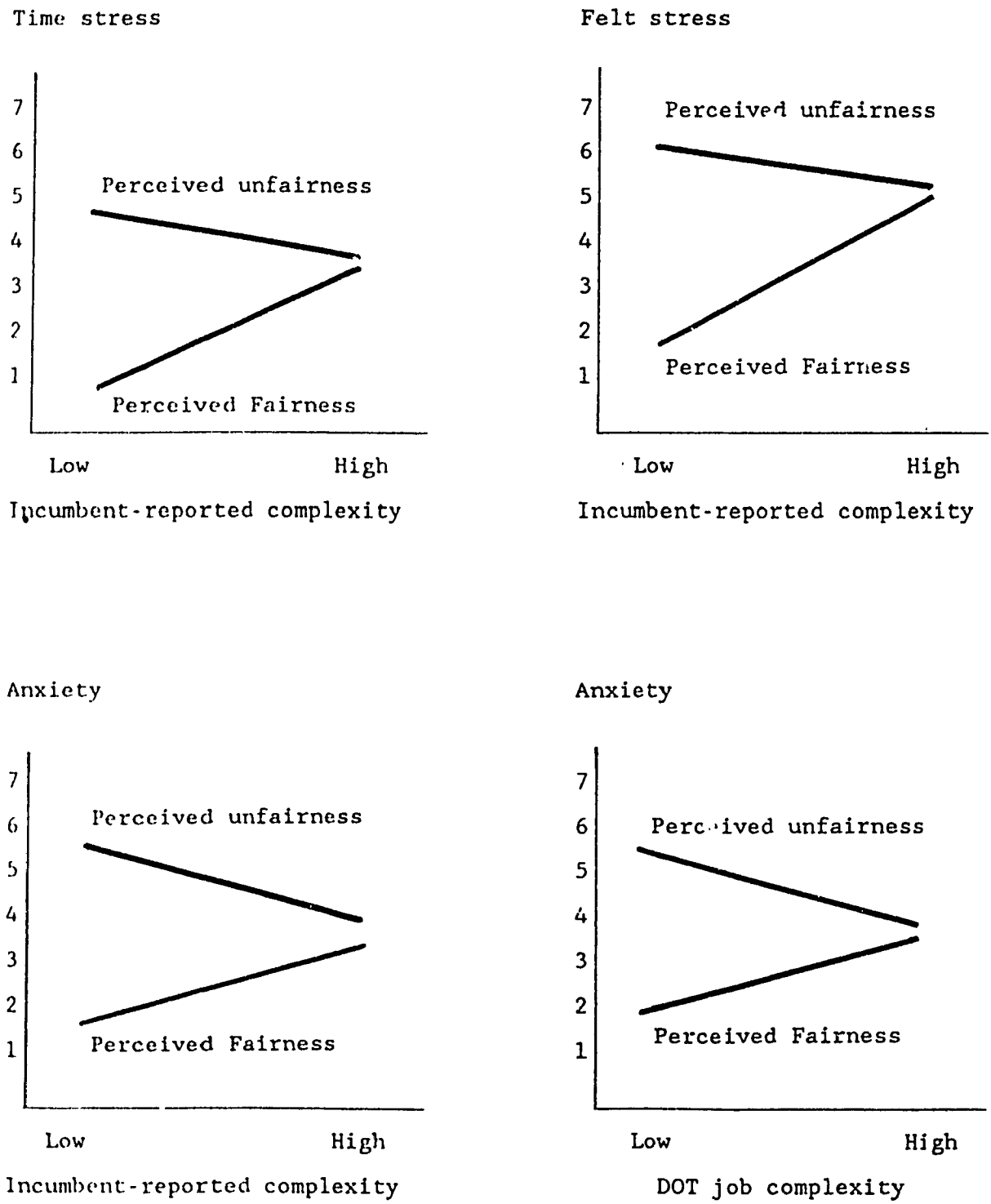
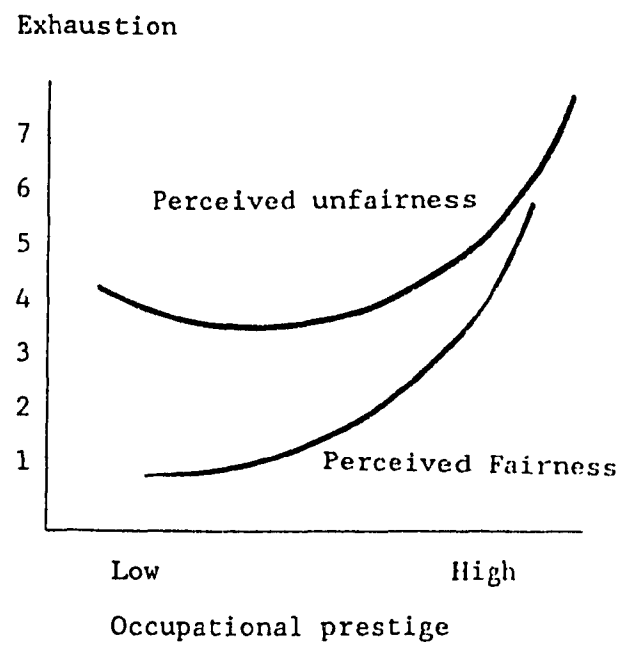


Figure 17.

Interaction between Occupational Prestige and Perceived Fairness on Exhaustion*




* Occupational prestige has a curvilinear relationship with exhaustion. The test of the interaction between this variable and perceived fairness on exhaustion used the following regression:

$$\text{Exhaustion} = OP + (OP)^2 + \text{Fairness} + OP \times \text{Fairness} + (OP)^2 \times \text{Fairness}$$

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Appendix 1.

Sample Description

| Occupational Code* | Title | Frequency | Percent | Cum. Percent |
|---|---|---|---|---|
| 0010000 | Accountants | 3 | .7 | .7 |
| 0020000 | Architects | 1 | .2 | 1.0 |
| 0030000 | Computer programmers | 2 | .5 | 1.4 |
| 0040000 | Computer systems analysts | 5 | 1.2 | 2.6 |
| 0050000 | Computer specialists, n.e.c. | 6 | 1.4 | 4.1 |
| 0060000 | Aeronautical and astronautical engineers | 1 | .2 | 4.3 |
| 0120000 | Electrical and electronic engineers | 3 | .7 | 5.0 |
| 0130000 | Industrial engineers | 11 | 2.6 | 7.7 |
| 0140000 | Mechanical engineers | 2 | .5 | 8.1 |
| 0230000 | Engineers, n..c. | 4 | 1.0 | 9.1 |
| 0440000 | Biological scientists | 8 | 1.9 | 11.0 |
| 0450000 | Chemists | 4 | 1.0 | 12.0 |
| 0510000 | Geologists | 1 | .2 | 12.2 |
| 0530000 | Physicists and astronomers | 1 | .2 | 12.4 |
| 0540000 | Life and physical scientists, n.e.c. | 1 | .2 | 12.7 |
| 0650000 | Physicians, medical and osteopathic | 3 | .7 | 13.4 |
| 0720000 | Veternarians | 1 | .2 | 13.6 |
| 0750000 | Registered nurses | 2 | .5 | 14.1 |
| 0760000 | Therapists | 2 | .5 | 14.6 |
| 0800000 | Clinical laboratory technologist and technicians | 2 | .5 | 15.1 |
| 0830000 | Radiologic technologists and technicians | 1 | .2 | 15.3 |
| 0850000 | Health technologists and technicians, n.e.c. | 3 | .7 | 16.0 |
| 1010000 | Recreation workers | 2 | .5 | 16.5 |
| 1100000 | Physics teachers | 1 | .2 | 16.7 |
| 1120000 | Mathematics teachers | 2 | .5 | 17.2 |
| 1150000 | Business and commerce teachers | 3 | .7 | 17.9 |
| 1230000 | Art, drama, and music teachers | 4 | 1.0 | 18.9 |
| 1260000 | English teachers | 2 | .5 | 19.4 |
| 1350000 | Miscellaneous teachers, college and university | 1 | .2 | 19.6 |
| 1400000 | Teachers, college and university, subject not specified | 3 | .7 | 20.3 |
| 1440000 | Secondary school teachers | 5 | 1.2 | 21.5 |
| 1500000 | Agriculture and biological technicians | 2 | .5 | 22.0 |
| 1520000 | Draftsmen | 1 | .2 | 22.2 |
| 1530000 | Electrical and electronic engineering technicians | 6 | 1.4 | 23.7 |
| 1620000 | Engineering and science technicians | 2 | .5 | 24.2 |
| 1630000 | Airplane pilots | 1 | .2 | 24.4 |
| 1730000 | Technicians, n.e.c. | 1 | .2 | 24.6 |
| 1830000 | Designers | 2 | .5 | 25.1 |
| 1920000 | Public relations men and publicity writers | 2 | .5 | 25.6 |
| 1930000 | Radio and television announcers | 1 | .2 | 25.8 |
| 1940000 | Writers, artists, and entertainers, n.e.c. | 5 | 1.2 | 27.0 |
| 1950000 | Research workers, not specified | 12 | 2.9 | 29.9 |
| 2020000 | Bank officers and financial managers | 5 | 1.2 | 31.1 |
| 2050000 | Buyers, wholesale and retail trade | 2 | .5 | 31.6 |

| | | | | |
|---|---|---|---|---|
| 2200000 | Office managers, n.e.c. | 4 | 1.0 | 32.5 |
| 2229270 | State public administration | 1 | .2 | 32.8 |
| 2229370 | Local public administration | 1 | .2 | 33.0 |
| 2230000 | Officials of lodges, societies, and unions | 3 | .7 | 33.7 |
| 2250000 | Purchasing agents and buyers, n.e.c. | 3 | .7 | 34.4 |
| 2300000 | Restaurant, cafeteria, and bar managers | 2 | .5 | 34.9 |
| 2310000 | Sales managers and department heads, retail trade | 1 | .2 | 35.2 |
| 2330000 | Sales managers, except retail trade | 5 | 1.2 | 36.4 |
| 2350000 | School administrators, college | 4 | 1.0 | 37.3 |
| 2400000 | School administrators (elementary and secondary managers) | 1 | .2 | 37.6 |
| 2453990 | Manufacturing, nondurable goods, salaried | 1 | .2 | 37.8 |
| 2454390 | Transportation, salaried | 6 | 1.4 | 39.2 |
| 2454990 | Communications, and utilities and sanitary services, salaried | 6 | 1.4 | 40.7 |
| 2455990 | Wholesale trade, salaried | 5 | 1.2 | 41.9 |
| 2456090 | Department and mail order establishments, salaried | 2 | .5 | 42.3 |
| 2456570 | Apparel and accessories stores (except shoes), self-employed | 1 | .2 | 42.6 |
| 2456990 | Other retail trade, salaried | 5 | 1.2 | 43.8 |
| 2456991 | Other retail trade, self-employed | 5 | 1.2 | 45.0 |
| 2457190 | Finance, insurance, and real estate, salaried | 10 | 2.4 | 47.4 |
| 2457191 | Finance, insurance, and real estate. self-employed | 1 | .2 | 47.6 |
| 2457990 | Personal services, salaried | 3 | .7 | 48.3 |
| 2457991 | Personal services, self-employed | 3 | .7 | 49.0 |
| 2459980 | All other industries, salaried | 9 | 2.2 | 51.2 |
| 2459981 | All other industries, self-employed | 1 | .2 | 51.4 |
| 2600000 | Advertising agents and salesmen | 1 | .2 | 51.7 |
| 2650000 | Insurance agents, brokers, and underwriters | 17 | 4.1 | 55.7 |
| 2700000 | Real estate agents and brokers | 2 | .5 | 56.2 |
| 2810000 | Sales representatives, manufacturing industries | 2 | .5 | 56.7 |
| 2820000 | Sales representatives, wholesale trade | 1 | .2 | 56.9 |
| 2830000 | Sales clerks, retail trade | 2 | .5 | 57.4 |
| 2840000 | Salesmen, retail trade | 5 | 1.2 | 58.6 |
| 2850000 | Salesmen of services and construction | 7 | 1.7 | 60.3 |
| 3010000 | Bank tellers | 8 | 1.9 | 62.2 |
| 3030000 | Billing clerks | 2 | .5 | 62.7 |
| 3050000 | Bookkeepers | 2 | .5 | 63.2 |
| 3100000 | Cashiers | 3 | .7 | 63.9 |
| 3120000 | Clerical supervisors, n.e.c. | 3 | .7 | 64.6 |
| 3140000 | Counter clerks, except food | 1 | .2 | 64.8 |
| 3210000 | Estimators and investigators, n.e.c. | 1 | .2 | 65.1 |
| 3310000 | Mail carriers, post office | 1 | .2 | 65.3 |
| 3320000 | Mail handlers, except post office | 1 | .2 | 65.6 |
| 3430000 | Computer and peripheral equipment operators | 2 | .5 | 66.0 |
| 3450000 | Key punch operators | 1 | .2 | 66.3 |
| 3550000 | Office machine operators, n.e.c. | 1 | .2 | 66.5 |
| 3600000 | Payroll and timekeeping clerks | 1 | .2 | 66.7 |
| 3640000 | Receptionists | 6 | 1.4 | 68.2 |
| 3710000 | Secretaries, medical | 2 | .5 | 68.7 |
| 3720000 | Secretaries, n.e.c. | 27 | 6.5 | 75.1 |
| 3740000 | Shipping and receiving clerks | 3 | .7 | 75.8 |
| 3750000 | Statistical clerks | 1 | .2 | 76.1 |

| | | | | |
|---|---|---|---|---|
| 3810000 | Stock clerks and storekeepers | 5 | 1.2 | 77.3 |
| 3850000 | Telephone operators | 1 | .2 | 77.5 |
| 3900000 | Ticket, station, and express agents | 1 | .2 | 77.8 |
| 3943980 | Manufacturing industries | 5 | 1.2 | 78.9 |
| 3944980 | Transportation, communications, and other public utilities | 3 | .7 | 79.7 |
| 3947190 | Finance, insurance, and real estate | 11 | 2.6 | 82.3 |
| 3948980 | Professional and related services | 1 | .2 | 82.5 |
| 3949390 | Public administration | 1 | .2 | 82.8 |
| 3949980 | Other miscellaneous clerical workers | 6 | 1.4 | 84.2 |
| 3950000 | Not specified clerical workers | 1 | .2 | 84.4 |
| 4100000 | Brickmasons and stonemason, apprentices | 1 | .2 | 84.7 |
| 4130000 | Cabinetmakers | 1 | .2 | 84.9 |
| 4150000 | Carpenters | 1 | .2 | 85.2 |
| 4260000 | Dental laboratory technicians | 1 | .2 | 85.4 |
| 4419980 | All other industries | 1 | .2 | 85.6 |
| 4529990 | All other industries | 2 | .5 | 86.1 |
| 4610000 | Machinists | 1 | .2 | 86.4 |
| 4710000 | Aircraft mechanics and repairmen | 2 | .5 | 86.8 |
| 4860000 | Railroad and car shop mechanics and repairmen | 1 | .2 | 87.1 |
| 4920000 | Miscellaneous mechanics and repairmen | 1 | .2 | 87.3 |
| 5230000 | Plumber and pipe fitter apprentices | 1 | .2 | 87.6 |
| 6020000 | Assemblers | 1 | .2 | 87.8 |
| 6100000 | Checkers, examiners, and inspectors, manufacturing | 1 | .2 | 88.0 |
| 6430000 | Packers and wrappers, except meat and produce | 2 | .5 | 88.5 |
| 6450000 | Photographic process workers | 2 | .5 | 89.0 |
| 6500000 | Drill press operatives | 1 | .2 | 89.2 |
| 6520000 | Lathe and milling machine operatives | 1 | .2 | 89.5 |
| 6740000 | Textile operatives, n.e.c. | 3 | .7 | 90.2 |
| 6800000 | Welders and flame-cutters | 1 | .2 | 90.4 |
| 6920000 | Machine operatives, not specified | 2 | .5 | 90.9 |
| 7030000 | Busdrivers | 1 | .2 | 91.1 |
| 7060000 | Fork lift and tow motor operatives | 2 | .5 | 91.6 |
| 7610000 | Lumbermen, raftsmen, and woodchoppers | 1 | .2 | 91.9 |
| 7803190 | Apparel and accessories | 1 | .2 | 92.1 |
| 9020000 | Cleaners and charwomen | 4 | 1.0 | 93.1 |
| 9100000 | Bartenders | 1 | .2 | 93.3 |
| 9140000 | Food counter and fountain workers | 3 | .7 | 94.0 |
| 9150000 | Waiters | 6 | 1.4 | 95.5 |
| 9160000 | Food service workers, n.e.c., except private household | 6 | 1.4 | 96.9 |
| 9250000 | Nursing aides, orderlies, and attendants | 4 | 1.0 | 97.8 |
| 9310000 | Airline stewardesses | 1 | .2 | 98.1 |
| 9320000 | Attendants, recreation and amusement | 1 | .2 | 98.3 |
| 9400000 | Boardinghouse and lodginghouse keepers | 1 | .2 | 98.6 |
| 9420000 | Child care workers, except private household | 1 | .2 | 98.8 |
| 9440000 | Hairdressers and cosmetologists | 1 | .2 | 99.0 |
| 9450000 | Personal service apprentices | 1 | .2 | 99.3 |
| 9620000 | Guards and watchmen | 1 | .2 | 99.5 |
| 9640000 | Policemen and detectives | 1 | .2 | 99.8 |
| 9800000 | Child care workers | 1 | .2 | 100.0 |

* These codes were derived from the Dictionary of Occupational Title (Roos & Treiman, 1980)

Thank you very much for answering the following questions.

1. What is your present job title? _____

2. What organization do you work for? _____

3. I would like to know what you do on your present job. Please be as specific as possible. For instance:
   - If you work in a dental clinic, please indicate whether you are a dentist? or a dental assistant? or a dental hygienist? or a clinical technician? or a receptionist?
   - If you are a machine operator, please indicate whether you are a drill press operator? or a grinding press operator? or a lathe and milling machine operator? .....
   - If you work in a bank, please indicate whether you are a teller? or a clerk? or an assistant manager? or an analyst? or a financial manager? .....

What do you do on your present job? _____

_____

_____

4. How long have you been working in your current job? _____ years Item 1

5. How long have you been in this line of work? _____ years Item 2

Section One

This part of the questionnaire asks you to describe your job, as objectively as you can. Please do not use this part of the questionnaire to show how much you like or dislike your job. Questions about that will come later. Instead, try to make your descriptions as accurate and as objective as you possibly can.

A sample question is given below.

A. To what extent does your job require you to work with mechanical equipment?

1 -------2 -------3 -------4 -------5 ------- (6) ------- 7

Very little: the job requires almost no contact with mechanical equipment of any kind. | Moderately | Very much: the job requires almost constant work with mechanical equipment.

You are to *circle* the number which is the most accurate description of your job.

If, for example, your job requires you to work with mechanical equipment a good deal of the time—but also requires some paperwork—you might circle the number six, as was done in the example above.

Now, please answer the following questions.

Item 3

1. To what extent does *doing the job itself* provide you with information about your work performance? That is, does the actual *work itself* provide clues about how well you are doing—aside from any "feedback" co-workers or supervisors may provide?

1 -------2 -------3 -------4 -------5 -------6 -------7

Very little: the job itself is set up so I could work forever without finding out how well I am doing. | Moderately: sometimes doing the job provides "feedback" to me: sometimes it does not. | Very much: the job is set up so that I get almost constant "feedback" as I work about how well I am doing.

2 How much *autonomy* is there in your job? That is, to what extent does your job permit you to decide *on your own* how to go about doing the work?

1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7

| | | | |
|---|---|---|---|
| Very little, the job gives me *almost no personal* "say" about how and when the work is done | Moderate autonomy: many things are standardized and not under my control, but I can make some decisions about the work. | Very much: the job gives me almost complete responsibility for deciding how and when the work is done. | Item 4 |

3 To what extent does your job involve doing a *"whole" and identifiable piece of work*? That is, is the job a complete piece of work that has an obvious beginning and end? Or is it only a small *part* of the overall piece of work, which is finished by other people or by automatic machines?

1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7 Item 5

| | | |
|---|---|---|
| My job is only a tiny part of the overall piece of work, the results of my activities cannot be seen in the final product or service. | My job is a moderate-sized "chunk" of the overall piece of work: my own contribution can be seen in the final outcome. | My job involves doing the whole piece of work, from start to finish: the results of my activities are easily seen in the final product or service. |

4 How much *variety* is there in your job? That is, to what extent does the job require you to do many *different* things at work, using a variety of your skills and talents?

1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7 Item 6

| | | |
|---|---|---|
| Very little, the job requires me to do the same routine things over and over again | Moderate variety. | Very much, the job requires me to do many different things, using a number of different skills and talents. |

5 In general, how *significant or important* is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people? Item 7

1 -------- 2 -------- 3 -------- 4 -------- 5 -------- 6 -------- 7

| | | |
|---|---|---|
| Not very significant, the outcomes of my work are *not* likely to have important effects on other people. | Moderately significant | Highly significant: the outcomes of my work can affect other people in very important ways. |

6 To what extent does your job provide you with opportunities for participation in decision making?

(1) In general, how much say or influence do you feel you have on what goes on in your working place? (Circle one)

1----------2----------3----------4----------5 Item 8

| | | | | |
|---|---|---|---|---|
| A very great deal of influence | A great deal of influence | Quite a bit of influence | Some influence | Little or no influence |

(2) Do you feel that you can influence the decisions of your immediate superior regarding things that you are concerned about? (Circle one)

1----------2----------3----------4----------5 Item 9

| | | | | |
|---|---|---|---|---|
| I can influence him/her to a very great extent | To a considerable extent | To some extent | To a very little extent | I can not influence him/her at all |

(3) Does your immediate superior ask your opinion when a problem comes up that involves your work? (Circle one)

1----------2----------3----------4----------5 Item 10

| | | | | |
|---|---|---|---|---|
| He/she always asks my opinion | Often asks | Sometimes asks | Seldom asks | Never asks my opinion |

(4) If you have a suggestion for improving the job, how easy is it for you to get your ideas across to your immediate superior? (Circle one)

Item 11

1----------2----------3----------4----------5

| | | | | |
|---|---|---|---|---|
| It is very difficult to get my ideas across | Somewhat difficult | Not too easy | Fairly easy | It is very easy to get my ideas across |

7. To what extent does your job provide you with responsibility? That is, does your job require you to be responsible for things and/or people in the work place? (Check (X) a response for each item)

| | (1) Very little responsibility | (2) Little responsibility | (3) Some responsibility | (4) Great responsibility | (5) Very great responsibility | |
|---|---|---|---|---|---|---|
| The responsibility you have for initiating assignments and projects | ----- | ---- | - -- | -- -- | - | Item 12 |
| The responsibility you have for budgets and expenditures | ----- | - - | - -- | - | - | Item 13 |
| The responsibility you have for carrying out assignments and projects | ----- | ---- | ---- | - | | Item 14 |
| The responsibility you have for equipment and facilities | ----- | - -- | - - | -- | | Item 15 |
| The responsibility you have for the work of others | -- | - | - | | | Item 16 |
| The responsibility you have for the future careers of others | ---- | | | | - | Item 17 |

## Section Two

The following items pertain to the physical conditions of your job. Please check (X) the appropriate response choice regarding the frequency with which these conditions occur in your working environment.

| | 1 Never | 2 Seldom | 3 Sometimes | 4 Often | 5 Always | |
|---|---|---|---|---|---|---|
| Temperature (too hot or too cold) | ----- | --- | ----- | - - | | Item 18 |
| Poor quality of light | ----- | ---- | - | - | - | Item 19 |
| Noisy | ----- | ----- | -- -- | -- | | Item 20 |
| Too crowded | ----- | ---- | --- | - - - | | Item 21 |
| Health and safety hazards | ----- | ----- | -- | - - | | Item 22 |
| Exposure to pollution | ----- | ----- | -- - | ----- | | Item 23 |
| Repetitive work | ----- | ----- | - - - | | | Item 24 |
| Heavy physical demand | ---- | -- - | - | | | Item 25 |
| Job insecurity | ----- | ---- | | - | | Item 26 |
| Too little fresh air | ----- | ----- | - -- | -- - | | Item 27 |
| Too much work with computer | ----- | ----- | - --- | ---- | - | Item 28 |
| Time pressure or speedy work | ----- | ----- | ---- | ----- | | Item 29 |

What shift(s) do you work? a.____ Day b.____Evening c.____Night d.____Nonroutine or rotating Item 30

## Section Three

Listed below are a number of statements which could be used to describe a job.
You are to indicate whether each statement is an accurate or an inaccurate description of your job.
Once again, please try to be as objective as you can in deciding how accurately each statement describes your job regardless of whether you like or dislike your job.

Write a number in the blank beside each statement, based on the following scale:

How accurate is the statement in describing your job?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Very Inaccurate | Mostly Inaccurate | Slightly Inaccurate | Uncertain | Slightly Accurate | Mostly Accurate | Very Accurate |

_____ The job requires me to use a number of complex or high-level skills. Item 31

_____ The job is arranged so that I do not have the chance to do an entire piece of work from beginning to end. Item 32

_____ Just doing the work required by the job provides many chances for me to figure out how well I am doing Item 33

_____ The job is quite simple and repetitive. Item 34

_____ The job is one where a lot of other people can be affected by how well the work gets done. Item 35

_____ The job denies me any chance to use my personal initiative or judgment in carrying out the work. Item 36

_____ The job provides me the chance to completely finish the pieces of work I begin. Item 37

_____ The job itself provides very few clues about whether or not I am performing well. Item 38

_____ The job gives me considerable opportunity for independence and freedom in how I do the work. Item 39

_____ The job itself is not very significant or important in the broader scheme of things. Item 40

## Section Four

This part of the questionnaire asks you to describe the fairness of the rewards which you have received in the work place. Fairness in the following questions means the extent to which the rewards are related to a person's contributions to the organization. Money, recognition, and physical facilities are examples of rewards.

Write a number in the blank beside each statement, based on the following scale:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Rewards are very fairly distributed | Quite fairly distributed | Some fairness | Very little fairness | Rewards are not distributed at all fairly |

____ To what extent are you fairly rewarded considering the responsibilities that you have? Item 41

____ To what extent are you fairly rewarded taking into account the amount of education and training that you have had? Item 42

____ To what extent are you fairly rewarded in view of the amount of experience that you have? Item 43

____ To what extent are you fairly rewarded for the amount of effort that you put forth? Item 44

____ To what extent are you fairly rewarded for work that you have done well? Item 45

____ To what extent are you fairly rewarded for the stresses and strains of your job? Item 46

## Section Five

The following items investigate individual preferences of job design. Please choose one answer for each item. If you would prefer the job in the left-hand column (Column A), indicate how much you prefer it by putting a check mark in a blank to the left of the "neutral" point. If you prefer the job in the right-hand column (Column B), check one of the blanks to the right of "neutral". Check the "neutral" blank only if you find the two jobs equally attractive or unattractive. Try to use the "neutral" blank rarely.

| Column A | | Column B |
|---|---|---|
| 1. A job which offers little or no challenge. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job which requires you to be completely isolated from coworkers Item 47 |
| 2. A job where the pay is very good. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job where there is considerable opportunity to be creative and innovative Item 48 |
| 3. A job where you are often required to make important decisions. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job with many pleasant people to work with Item 49 |
| 4. A job with little security in a somewhat unstable organization. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job in which you have little or no opportunity to participate in decisions which affect your work. Item 50 |
| 5. A job in which greater responsibility is given to those who do the best work. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job in which greater responsibility is given to loyal employees who have the most seniority Item 51 |
| 6. A job with a supervisor who sometimes is highly critical. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job which does not require you to use much of your talent. Item 52 |
| 7. A very routine job. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job where your coworkers are not very friendly Item 53 |
| 8. A job with a supervisor who respects you and treats you fairly. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job which provides constant opportunities for you to learn new and interesting things Item 54 |
| 9. A job where you have a real chance to develop yourself personally. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job with excellent vacations and fringe benefits Item 55 |
| 10. A job where there is a real chance you could be laid off. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job with very little chance to do challenging work. Item 56 |
| 11. A job with little freedom and independence to do your work in the way you think best. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job where the working conditions are poor Item 57 |
| 12. A job with very satisfying teamwork. | Strongly prefer A ___ ___ ___ ___ ___ ___ ___ Neutral Strongly prefer B | A job which allows you to use your skills and abilities to the fullest extent. Item 58 |

## Section Six

The following statements investigate the "match" between a person and his or her job. Please write a number in the blank for each statement based on the scale below

How much do you agree with the statement?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Disagree Strongly | Disagree | Disagree Slightly | Neutral | Agree Slightly | Agree | Agree Strongly |

_____ I feel I have adequate preparation for the job I now hold. Item 59

_____ I feel competent and fully able to handle my job. Item 60

_____ I feel that my job and I are well-matched Item 61

_____ I feel my work utilizes my full abilities Item 62

_____ My job gives me a chance to do the things I feel I do best. Item 63

_____ I do not think that the job I am performing matches my needs and desires. Item 64

_____ My job provides me with sufficient opportunities to satisfying my needs for growth. Item 65

_____ My needs for personal growth cannot be satisfied by the job I am performing. Item 66

## Section Seven

Listed below are a number of statements which could be used to investigate the "working roles" a person may play in his or her organization Please write a number in the blank for each statement based on the scale below.

How much do you agree with the statement?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Disagree Strongly | Disagree | Disagree Slightly | Neutral | Agree Slightly | Agree | Agree Strongly |

_____ I feel certain about how much authority I have. Item 67

_____ Clear, planned goals and objectives exist for my job. Item 68

_____ I have to do things that should be done differently. Item 69

_____ I know that I have divided my time properly on my job. Item 70

_____ I receive an assignment without the staff to complete it. Item 71

_____ I know what my responsibilities are. Item 72

_____ I have to buck a rule or policy in order to carry out an assignment. Item 73

_____ I work with two or more groups which operate quite differently. Item 74

_____ I know exactly what is expected of me Item 75

_____ I receive incompatible requests from two or more people. Item 76

_____ I do things that are apt to be accepted by one person and not accepted by others. Item 77

Please write a number in the blank for each statement based on the scale below.

How much do you agree with the statement?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Disagree Strongly | Disagree | Disagree Slightly | Neutral | Agree Slightly | Agree | Agree Strongly |

_____ I receive an assignment without adequate resources and materials to execute it — Item 78

_____ Explanation is clear of what has to be done on my job — Item 79

_____ I work on unnecessary things — Item 80

## Section Eight

The following statements pertain to the "stressfulness" of your job. Please write a number in the blank for each statement based on the scale below

How much do you agree with the statement?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Disagree Strongly | Disagree | Disagree Slightly | Neutral | Agree Slightly | Agree | Agree Strongly |

_____ very few stressful things happen to me at work — Item 81

_____ I have felt fidgety or nervous as a result of my job — Item 82

_____ Working here makes it hard to spend enough time with my family — Item 83

_____ My job is extremely stressful — Item 84

_____ My job gets to me more than it should — Item 85

_____ I spend so much time at work that I can't see the forest for the trees — Item 86

_____ There are lots of times when my job drives me right up the wall. — Item 87

_____ Working here leaves little time for other activities — Item 88

_____ Sometimes when I think about my job I get a tight feeling in my chest. — Item 89

_____ I frequently get the feeling I am married to the company — Item 90

_____ I have too much work and too little time to do it in — Item 91

_____ I feel guilty when I take time off from my job — Item 92

_____ I almost never feel stressed at work. — Item 93

_____ I sometimes dread the telephone ringing at home because the call might be job related — Item 94

_____ I feel like I never have a day off — Item 95

_____ Too many people at my level in the company get burned out by job demands — Item 96

## Section Nine

The following statements describe feeling, people may have about their work. Please indicate how often each statement applies to you by using the response scale below.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Never | A few times a year | Monthly | A few times a month | Every week | A few times a week | Every day |

| | | |
|---|---|---|
| ____ | I feel emotionally drained from my work | Item 97 |
| ____ | I feel used up at the end of the workday | Item 98 |
| ____ | I feel fatigued when I get up in the morning and have to face another day on the job. | Item 99 |
| ____ | Working with people all day is really a strain for me. | Item 100 |
| ____ | I feel burned out from my work | Item 101 |
| ____ | I feel frustrated by my job. | Item 102 |
| ____ | I feel I am working too hard on my job | Item 103 |
| ____ | Working directly with people puts too much stress on me | Item 104 |
| ____ | I feel like I am at the end of my rope | Item 105 |

**General Background**

1. Please circle the number of years of schooling you completed: Item 106

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Grade School — High School — College / University — Graduate or Professional School

2. Sex ____Male ____Female Item 107

3. Age (Circle one) ____under 20 ____20-29 ____30-39 ____40-49 ____50-59 ____60 or over Item 108

4. Marital status (Circle one) ____Single ____Married ____Other Item 109

Is there anything else you would like to comment on about your job or your responses to the questions contained in this questionnaire? Please use the back of this page to respond.

Thank you for your cooperation!

Appendix 3: Factor Analysis of the Twenty-Five Items Measuring Job Characteristics

Maximum Likelihood (ML) Extraction

| Factor | Eigenvalue | PCT of VAR | CUM PCT |
|---|---|---|---|
| 1 | 7.05715 | 28.2 | 28.2 |
| 2 | 1.64931 | 6.6 | 34.8 |
| 3 | 1.08535 | 4.3 | 39.2 |
| 4 | 1.02036 | 4.1 | 43.2 |
| 5 | .83521 | 3.3 | 46.6 |
| 6 | .63968 | 2.6 | 49.1 |

Rotated Factor Matrix (Varimax Rotation)

| Item number* | Variable | Factor loadings | | | | | |
|---|---|---|---|---|---|---|---|
| | | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 |
| Item 16 | Responsibility | .75 | | | | | |
| Item 13 | Responsibility | .68 | | | | | |
| Item 17 | Responsibility | .61 | | | | | |
| Item 12 | Responsibility | .58 | | | | | |
| Item 8 | PDM | .57 | | | | | |
| Item 15 | Responsibility | .52 | | | | | |
| Item 14 | Responsibility | .47 | | | | | |
| Item 4 | Autonomy | | .64 | | | | |
| Item 6 | Variety | | .61 | | | | |
| Item 39 | Autonomy | | .57 | | | | |
| Item 34 | Variety | | .56 | | | | |
| Item 36 | Autonomy | | .48 | | | | |
| Item 11 | PDM | | .38 | | | | |
| Item 3 | Feedback | | | .70 | | | |
| Item 38 | Feedback | | | .64 | | | |
| Item 33 | Feedback | | | .62 | | | |
| Item 7 | Significance | | | | .70 | | |
| Item 35 | Significance | | | | .51 | | |
| Item 40 | Significance | | | | .48 | | |
| Item 31 | Variety | | .39 | | | | |
| Item 9 | PDM | | | | | .76 | |
| Item 10 | PDM | | | | | .61 | |
| Item 37 | Identity | | | | | | .79 |
| Item 32 | Identity | | | | | | .53 |
| Item 5 | Identity | | | | | | .50 |

Note: Quartimax rotation and Oblimin rotation were also operated. The results were very similar to those reported above.
* These item numbers are consistent with those on the questionnaire (Appendix 2).

Appendix 4: Factor Analysis of the Twenty-Four Items Measuring Job Stress

Maximum Likelihood (ML) Extraction

| Factor | Eigenvalue | PCT of VAR | CUM PCT |
|---|---|---|---|
| 1 | 9.56017 | 38.2 | 38.2 |
| 2 | 1.48585 | 5.9 | 44.2 |
| 3 | .99263 | 4.0 | 48.2 |
| 4 | .70951 | 2.8 | 51.0 |

Rotated Factor Matrix (Varimax Rotation)

| Item number* | Variable | Factor loadings | | | |
|---|---|---|---|---|---|
| | | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
| Item 102 | Exhaustion | .79 | | | |
| Item 101 | Exhaustion | .72 | | | |
| Item 99 | Exhaustion | .65 | | | |
| Item 105 | Exhaustion | .62 | | | |
| Item 98 | Exhaustion | .58 | | | |
| Item 97 | Exhaustion | .57 | | | |
| Item 89 | Anxiety | .47 | .37 | | |
| Item 87 | Anxiety | .46 | .40 | | |
| Item 103 | Exhaustion | .44 | | | |
| Item 88 | Time stress | | .80 | | |
| Item 86 | Time stress | | .71 | | |
| Item 83 | Time stress | | .63 | | |
| Item 90 | Time stress | | .62 | | |
| Item 95 | Time stress | | .46 | | |
| Item 91 | Time stress | | .44 | | |
| Item 92 | Time stress | | | | |
| Item 84 | Felt stress | | | .72 | |
| Item 82 | Anxiety | | | .68 | |
| Item 93 | Felt stress | | | .67 | |
| Item 85 | Anxiety | .39 | | .57 | |
| Item 81 | Felt stress | | | .51 | |
| Item 96 | Time stress | | | .47 | |
| Item 100 | Exhaustion | | | | .69 |
| Item 104 | Exhaustion | | | | .68 |

Note: Quartimax rotation and Oblimin rotation were also operated. The results were very similar to those reported above.
* These item numbers are consistent with those on the questionnaire (Appendix 2).

Appendix 5: Factor Analysis of Seven Job Characteristics, Two Role Stressors, and Four Stress Variables

Maximum Likelihood (ML) Extraction

| Factor | Eigenvalue | PCT of VAR | CUM PCT |
|---|---|---|---|
| 1 | 3.13489 | 24.1 | 24.1 |
| 2 | 2.81990 | 21.7 | 45.8 |
| 3 | .64508 | 5.0 | 50.8 |

Rotated Factor Matrix (Varimax Rotation)

| Variable | Factor loadings | | |
|---|---|---|---|
| | Factor 1 | Factor 2 | Factor 3 |
| Anxiety | .88938 | | |
| Time stress | .78060 | | |
| Felt stress | .74560 | | |
| Exhaustion | .71395 | | |
| Variety | | .72843 | |
| Responsibility | | .72233 | |
| PDM | | .71656 | |
| Autonomy | | .70768 | |
| Significance | | .42083 | |
| Identity | | .40651 | |
| Role ambiguity | | | .61350 |
| Feedback | | .40722 | -.55513 |
| Role conflict | | | .50877 |

Note: Quartimax rotation and Oblimin rotation were also operated. The results were very similar to those reported above.

Appendix 6.

Results of Confirmatory Factor Analysis

LISREL Estimate (Maximum Likelihood)

LAMBDA X

| | Complexity | Conditions |
|---|---|---|
| Incumbent-reported complexity | .387 | .000 |
| DOT complexity | 2.006 | .000 |
| Occupational prestige | 11.773 | .000 |
| Incumbent-reported working conditions | .000 | .173 |
| DOT working conditions | .000 | .232 |

PHI

| | Complexity | Conditions |
|---|---|---|
| Complexity | 1.00 | |
| Conditions | -.928 | 1.00 |

Fitted Covariance Matrix

| | Incumbent-reported complexity | DOT complexity | Occupational prestige | Incumbent-reported working conditions | DOT working conditions |
|---|---|---|---|---|---|
| Incumbent-reported complexity | .680 | | | | |
| DOT complexity | .776 | 4.220 | | | |
| Occupational prestige | 4.558 | 23.614 | 189.380 | | |
| Incumbent-reported working conditions | -.062 | -.321 | -1.883 | .330 | |
| Occupational prestige | -.083 | -.432 | -2.537 | .040 | .380 |

Fitted Residuals

| | Incumbent-reported complexity | DOT complexity | Occupational prestige | Incumbent-reported working conditions | DOT working conditions |
|---|---|---|---|---|---|
| Incumbent-reported complexity | .000 | | | | |
| DOT complexity | -.006 | .000 | | | |
| Occupational prestige | .202 | .006 | .000 | | |
| Incumbent-reported working conditions | -.028 | -.009 | .493 | .000 | |
| Occupational prestige | -.007 | .002 | -.073 | .000 | .000 |

Summary of the Results:

Total coefficient of determination for X - variables is .961;

Chi-square with 4 degrees of freedom = 10.73 ($p$ = .03);

Goodness of fit index = .990;

Adjusted goodness of fit index = .963.