EVALUATION OF PSYCHOMETRIC METHODOLOGIES USED TO ASSESS OCCUPATIONAL STRESS AND STRAIN

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"EVALUATION OF PSYCHOMETRIC METHODOLOGIES

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I. Executive Summary

As physical, chemical, and mechanical hazards in the workplace come under increasing control and the health and safety problems they cause recede in prevalence, occupational health specialities will focus ever increasing attention on the remaining burden of illness and injury among workers. Research evidence suggests that occupational stress may well be an important contributor to this remaining morbidity, as well as contributing to those categories of mental and physical illness and injury which appear to be increasing.

Although occupational stress and strain has been studied for several decades, advancement of knowledge in the most recent years has been less than expected. One reason for this is the collection of diffuse and often technically weak techniques and measures used to assess stress and strain.

For this project the authors made an overview of the very extensive research literature reporting on psychometric approaches to measuring occupational stress and strain. The authors identified several categories of concepts central to this research area, including stressors in the job itself, those related to the organization of work, those due to changes in work conditions, and major categories of non-work stressors. We identified psychosocial components of work strain, both those expressed in terms of the job (e.g., burnout) and more general affective reactions (e.g., depression, fatigue). Finally, we identified aspects of the work environment and other classes of intervening variables which may modify the nature and intensity of the relation of work stressors to expressed strain, and of both stressors and strain to more definite health outcomes.

The authors then identified scales, tests, and other measures of these central concepts, ascertained the frequency of use of the many measures cited,and reviewed in more depth the technical soundness of the most commonly

purposes in the workplace.

The purpose of our review activities was to identify those concepts pertinent to occupational stress and strain for which satisfactory measures are available, those concepts for which measures are available but where improvement in their psychometric properties is important, and finally, those concepts for which no frequently used measures were revealed by the literature search. This "taking stock" of the available scales should contribute to a standardization of methodology and, consequently, an improvement in the comparability of occupational stress studies and hence a more rapid accumulation of definitive understanding of the field.

Our UTMB project team utilized the following general strategy for conducting this evaluation study. First, we reviewed NIOSH publications and other recent summary articles on the status of the relation of occupational stress to behavioral and health outcomes. This up-to-date snapshot of the current structuring of this field permitted us to prepare a list of salient constructs and concepts currently accepted as environmental and personal stressors, those commonly invoked as modifying or intermediary variables, and those generally negative outcomes ("strain") which are commonly measured in occupational stress research and used to demonstrate the validity of the "stressors" as noxious influences. A list of independent, modifying, and outcome variables is presented as Table 1.

Our next step was to utilize the concepts and constructs in Table 1 to generate a list of indexing words to use in our computerized searches of data bases containing bibliographic citations of the scientific literature. It should be noted that it was the initial pass through the literature that generated over 15,000 citations. Thus the indexing words were quite important in winnowing down the literature to manageable size.

Table 1.

INDEXING WORDS USED IN COMPUTERIZED LITERATURE SEARCH

Measures of (or) Scales of
- Occupational Stress
- Job Stress
- Employee Stress
- Co-Worker Stress
- Work Stress
- Employment Stress

Occupational Terms
- Job tempo
- Job displacement (technology)
- Job satisfaction
- Job control (Expectation of or need for)
- Job mobility
- Job changes
- Job demands
- Job loss
- Job latitude
- Job characteristics
- Job ambiguity
- Job freedom
- Job enlargement/enrichment
- Unemployment
- Layoffs
- Work conditions
- Wages and promotions
- Co-workers
- Supervisors
- Subordinates
- Vigilance
- Task difficulty
- Task monotony
- Time pressures
- Work overload or underload
- Crowding
- Frustration
- Evaluation (of work)
- Value of job
- Environment

Management Issues
- Absenteeism
- Productivity
- Turnover
- Workman's compensation
- Insurance claims
- Health care costs
- Medical expenditures

Alcohol abuse

Psychological Variables
- Anxiety
- Depression
- Distress
- Anger-Hostility
- Hardiness
- Coping skills
- Host resistance

Psychometric Terms
- Reliability
- Validity
- Assessment
- Inventory

These indexing words, developed in conjunction with Alice Wygant, our library scientist, were utilized in various ways depending on the format of the bibliographic file to be searched. For instance, Table 2 presents the stress-related terms that were searched in the MEDLINE/MEDLARS system, which contains citations listed inIndex Medicus from 1966 to the present. These terms were paired with those listed in Table 3, which is comprised of words related to occupational factors and the work experience. Other files had different requirements and limitations. For example, two procedures were employed for PSYCHINFO (Psychological Abstracts from 1967 to the current file). This literature was searched first solely with the phrase "occupational stress," and then with "stress" paired with following:

psychometrics
experimental design
experimentation
measurement/psychophysics
statistical analysis
testing

This pairing was done to obtain as much information as possible on available methodological work. EMBASE (Excerpta Medica) was examined from 1980 to the present using such terms as "occupations," "job," "employ," "career" and a specification of Section 035 (Occupational Health and Industrial Medicine) paired with "stress" and with the words "method," "technique," "technic," "measure" or "psychometric."

A search of SOCABS (Sociological Abstracts) employed similar terms, as "stress" was combined with "psychometric," "measure," "technique," "technic," "test" and "method." Finally, Books in Print was explored for volumes in the last five years with the word "stress" in the title.

The still voluminous literature generated by this searching strategy was studied by title and abstract. This enabled the study team to identify over 70 scales, measures, questionnaires, and other psychometric methods pertinent to occupational stress and strain from 905 journal articles and 344 books. We

Table 2

MEDLINE/MEDLARS Stress-Related Index Words

Stress, Psychological
Burnout, Professional
Life Style
Life Change Events
Stress
General Adaptation Syndrome

Also: Stress and its variants picked up as textword in title or abstract

Also: Above terms plus Psychometrics

Table 3

MEDLINE/MEDLARS Occupational Index Words

Occupational Disease
  Agricultural Workers Diseases
  Occupational Dermatitis
  Pneumoconiosis
    etc.
Occupational Health Services
Occupations
  Named groups by occupation (n=69)
  Career Mobility
Occupational Medicine
Psychology, Industrial
Job Satisfaction
Environmental Pollution
Accidents, Occupational
Career Choice
United States Occupational Safety and Health Administration
Environmental Exposure
Absenteeism
Task Performance and Analysis
Time and Motion Studies
Vocational Guidance
Efficiency
Industry
Employment

then utilized the Science Citation Index and the Social Science Citation Index to identify the frequency with which the original articles or books presenting the source material for that scale or measure were cited in subsequent serials literature. (The scales for which we did Citation Index searches are grouped by general topic area and listed by title of scale and authors in Table 4). We reasoned that scales for which only one or two additional citations could be found were unlikely to have generated the broad base of reliability, validity, and utility data which would warrant their recommendation as an important measure. In a sense, we were allowing the publishing researchers to screen the many scales which have been developed and to tell us by their patterns of use which scales had accumulated a reputation for scientific value. This approach has the weakness of causing us to ignore some excellent approaches which currently have not been discovered by the scientific community. Given the vast number of scales that are developed each year, most of which are never used again, we decided to take this risk of failing to identify a few unused good scales in exchange for the greater assurance that we would be identifying those methods which had withstood the test of time and the passing of fad and fancy and were continuing to make a contribution to our scientific knowledge. It is most likely that future progress in the field will either utilize these better established measures or at least will move forward using these widely understood measures as bench marks for future progress.

This review will begin with a discussion of psychosocial measures of stressors in the workplace. The factors to be addressed include stressors inherent in the work itself, stressors resulting from the structure of the work situation, and stressors due to alterations in the work experience. A view of non-work stressors will be included as well. Next we will examine psychosocial assessments of work strain, with particular attention to job-relevant outcomes including job satisfaction and burnout, and to more general affective states.

Some of the important issues associated with conducting research in occupational stress will follow, concluding with our recommendations for future directions of this growing and significant field.

TABLE 4: SCALES REVIEWED IN THIS REPORT

Psychosocial Measures of Work Stressors

Stressors in the Activity and Organization of Work

Berger-Gross, (1982)

Butcke, Moracco, & McEwen, (1984)

Clark, (1980)

Gray-Toft, & Anderson, (1981)

Indik, Seashore, & Slesinger, (1964)

Ivancevich, & Matteson, (1984)

Kahn, Wolfe, Quinn, Snoek, & Rosenthal, (1964)

Karasek, (1979)

Koch, Tung, Gmelch, & Swent, (1982)

Parasuraman, & Alutto, (1981)

Rahim, (1983)

Rizzo, House, & Lirtzman, (1970)

Psychosocial Measures of Work Strain

Job-Referenced States

Burnout/Tension

Emener, Luck, & Gohs, (1982)

Ford, Murphy, & Edwards, (1983)

Howard, Cunningham, & Rechnitzer, (1977)

Keenan, & McBain, (1979)

Lyhons, (1971)

Maslach, & Jackson, (1981)

Pines, Aronson, & Kafry, (1981)

Rizzo, House, & Lirtzman, (1970)

Tosi, (1971)

Job Satisfaction

Alderfer, (1972)

Alutto & Vredenburgh, (1977)

Brayfield & Rothe, (1951)

Bullock, (1952)

Cammann, Fichman, Jenkins & Klesh, (1979)

Cross, (1973)

Dawis, Pinto, Wetzel, & Wezzer, (1974)

French and Caplan, (1972)

Graen, Dansereau, & Minami, (1972)

Hackman & Oldham (1976)

Hall & Williams, (1973)

Hoppock, (1935)

Ivancevich, (1974)

Katzell, Ewen, & Korman, (1974)

King, (1960)

Koch, (1977)

Kopelman, (1976)

Kornhauser, (1965)

McDonald & Gunderson, (1974)

Murphy & Fraser, (1978)

O'Brien & Dowling, (1980)

Parry & Warr, (1980)

Porter, (1961), (1962)

Quinn & Shephard, (1974)

Quinn & Staines, (1979)

Rizzo, House, & Lutzman, (1970)

Smith, (1962), (1976)

Smith, Kendall, & Hulin, (1969)

Stamps, Piedmonx, Slavitt, & House, (1978)

Stodgill, (1965)

Taylor & Bowers, (1972)

Vroom, (1960)

Warr, Cook, & Wall, (1979)

Warr & Routledge, (1969)

Weiss, Dawis, England, & Lofquist, (1967)

Leader Behavior

Fleishman, (1972)

Fleishman, (1969)

Stogdill, (1963)

Affective States

Beck et al, (1961)

Bradburn, (1969)

Cox, Thirlaway, Gotts, & Cox, (1983)

Dempsey, (1964)

Dupuy, (1973)

Fordyce, (1977)

McNair, Lorr, & Droppleman, (1971)

Radloff, (1977)

Spielberger, Gorsuch, & Lushene, (1970)

Veit & Ware, (1983)

Zung, (1971)

Zung, (1965)

III. Psychosocial Measures of Work Stressor

Stressors in the Activity and Organization of Work

As other contributors to occupational illness and injury have come under better control, the issue of stress on the job has assumed greater prominence The increasing interest in techniques of stress management in occupational settings also reflects this trend. It is clear, however, that simply asking an employee "Is your job stressful?" is not sufficient or scientifically adequate. Not only may the employee have a different conception of stress from his co-workers or the investigator, but in addition, this approach leaves undetermined the characteristics of the job, the person, and their interaction that may produce stress-related perceptions and outcomes. Thus several approaches may be utilized in going beyond the simplistic question posed above. One of these is to focus on the structural features of the job and one's responses to them. This sociologically-oriented perspective emphasizes such features as roles, leader-subordinate interactions and other factors in the design of the organization. Measures of the stress engendered by these characteristics will address role clarity/ambiguity, role conflicts, work overload, and job demands. This type of index has received the most study to date perhaps because sociology has a longer history of studying occupational environments.

A somewhat different perspective arises out of a more psychological approach, which uses the individual as its primary focus; specifically, what are the worker's affective responses to the job situation? Examples of this type of measure are that of job satisfaction and burnout, the latter being concerned with the exhaustion of the ability to deal with the prolonged and powerful stresses evident in some job categories. This review will discuss a number of measures of both types, emphasizing the more structural measures first, focusing on ones which have some psychometric data to which we can refer. There are surprisingly few scales which have supportive information, because many measures

used in one study are rarely used again without modification. At the end of this review we will discuss some of the problems in this field of research and concerns for the future, and the issue of idiosyncratic scales will be raised again at that time. This section will also address issues of supervisor behavior and person-environment fit.

Job-Related Tension Index-Kahn, Wolfe, Quinn, Snoek & Rosenthal (1964)

Job-Related Strain Index-Indik, Seashore & Slesinger (1964)

These two scales are grouped because they contain most of the same items, developed in the early 1960s by the Survey Research Center at the University of Michigan. Both scales (Kahn et al = JRT; Indik et al = JRS) in their original form had virtually the same 15 statements concerning problems on the job. Respondents indicated on a five-point Likert scale, the extent to which these situations bothered them. Each scale was intended to measure a wide range of job characteristics, in particular role conflict and ambiguity, incompatibility between job demands and available resources, and work overload (Indik et al., 1964). While the titles of the measures refer to "tension" and "strain", the scales focus more on job stressors than on emotional responses to work stress. The JRS was scored by summing the responses for all items, whereas the JRT used a mean of the ratings. Kahn et al. do not report any psychometric analyses of the JRT, but Indik et al. noted a split-half reliability of 0.85, with total index scores ranging from 15 (low strain) to 68 (high) and a mean of 29.6. The JRS was also found to be lower among older groups and higher among men. The JRT was positively related to a variety of factors including alternative measures of role conflict, ambiguity and expectation, providing some construct validity support.

Since these scales were published, other investigators have employed them in three different ways: (1) as overall job stress scales; (2) as measures of

various aspects of the job situation with subscales obtained through factor analysis; (3) as a starting point for the development of new scales. Of those studies which have utilized the entire scales, few report psychometric properties of these measures. Bateman and Strasser (1983) are an exception, noting that the JRT had an internal consistency of 0.76 and a test-retest reliability over 5 months of 0.71. Mean scores for either scale present a somewhat confused picture, as some studies use 14 items with a possible range from 14 to 46 (Burke, 1976), 15 items with a 5-point Likert scale (Ivancevich, Napier & Wetherbe, 1983) or 19 items with a 5 point scale (Kasl, Chisholm & Eskenazi, 1981). While some investigators find few significant relationships between these scales and job tension (Ivancevich et al., 1983), others note a negative correlation between the above measures and job satisfaction (Burke, 1976) even over time (Bateman & Strasser, 1983), while Kasl et al. (1981) noted more stress among both supervisory and non-supervisory personnel during the Three Mile Island incident than among workers at a control plant.

Following the lead of Burke and Belcourt (1974) and MacKinnon (1978), various researchers have examined the factor structure of the JRS and JRT and used subscales to measure facets of job stress. Typically the factors that are derived relate to role ambiguity, role conflict, role overload and resource inadequacy/uncertainty about acceptance. There is lack of consistency, however, as the number of factors and constituent items in each varies across studies. The available evidence does indicate that reliabilities of these factors generally are in the 0.70 to 0.80 range (Jamal, 1984; Pettegrew & Wolf, 1982) and that observed relationships are supportive of both construct (Vredenburgh & Trinkaus, 1983; Jamal, 1984) and predictive validities (Pettegrew & Wolf, 1982).

Finally, it should be noted that several papers have employed revised versions of the JRS (Berger-Gross, 1982), or used the JRS as a core for the development of a new instrument (e.g., Administrative Stress Index - Tung, 1980;

Koch, Tung, Gmelch & Swent, 1982), or used a subset of questions from the JRT for the development of a Tension Index (Lyons, 1971). The Berger-Gross (1982) measure consisted of three factors, namely role ambiguity (alpha = 0. 75), promotional uncertainty (alpha = 0.71) and work overload (alpha = 0.75). Howard et al. (1977) used various items from the JRT and added others to create a 25-item measure with subscales of Ambiguity, Locked-In, Stagnation, Isolation, and Contentment. The Administrative Stress Index (ASI) (Tung, 1980) contains factors of role-based stress (alpha = 0.81), conflict-mediating stress (alpha = 0.77) and boundary-spanning stress (alpha = 0.70). Although the ASI has been examined with regard to age, sex, experience and tenure of respondents, further work on these and other related scales is required for assessment of validity.

Another scale requiring further psychometric work is the Stress Diagnostic Survey (SDS) (Ivancevich & Matteson, 1984). This measure utilizes items from the JRT and other sources and consists of 7 macro and 8 micro work dimensions, each with 4 items. Variants of the SDS have been found to discriminate among managers (Ivancevich, Matteson & Preston, 1982), nurses (Ivancevich & Matteson, 1980; Ivancevich et al., 1982; Preston, Ivancevich & Matteson, 1981), and medical technologists (Matteson & Ivancevich, 1982). Available reliability information suggests that internal consistency measures for the various subscales vary from 0.53 to 0.79 (most in the 0.65 to 0.75 range), two-week test-retest approximately the same, and 12-month stability varying from 0.50 to 0.60 (Ivancevich & Matteson, 1984). Finally, Lyons (1971) selected nine items from the JRT to utilize as a measure of job tension. The internal consistency of this measure has been estimated to range from 0.70 to 0.77 and it has also been positively related to measures of role ambiguity and conflict (Lyons, 1971; Brief & Aldag, 1976). Thus the JRS and JRT have served to stimulate research, but variations in the employment of these scales and concerns over single-versus

multi-factor measures invite careful consideration of the use of these scales and their derivatives.

Role Conflict and Role Ambiguity-Rizzo, House and Lirtzman, 1970.

As conceptualized by the authors, role conflict occurs when the behaviors demanded by an individual's roles are inconsistent. This inconsistency may arise when there are discrepancies between the individual's values and expected role behavior, between available resources and defined role activities, between behaviors required for co-existing roles, and between expectations and organizational requests and standards. These discrepanices were felt to produce role conflict which in turn would produce strain, dissatisfaction and lowered productivity. Role ambiguity is less extensively defined, but generally refers to lack of certainty regarding expectations, responsibilities, authority and objectives.

From an initial pool of 30 items the authors derived through factor analysis an 8-item role conflict (RC) scale and a 6-item role ambiguity (RA) measure. Each item is rated by respondents as applicable to him/her on a 1 to 7 scale ranging from "very false" to "very true." The mean value for all the items on each scale becomes the score for that index. Rizzo et al. reported Kuder-Richardson internal consistency reliabilities of .78 and greater for both scales over two samples, with means for RC ranging from 3.86 to 4.19 and from 3.79 to 4.03 for RA. The scales correlated .25 with each other in one sample and were uncorrelated in another. Some evidence for construct validity was also provided as RC and RA were consistently and negatively correlated with aspects of job satisfaction, perceptions of leadership quality and various organizational characteristics. They were positively related to job-induced anxiety, general fatigue, discomfort, and propensity to leave the organization.

These scales are important because they are the most commonly used measures

of RC and RA. Indeed, in their review of this area, Van Sell, Brief,and Schuler (1981) noted that half of the studies they examined utilized the Rizzo et al. scales, while the remaining half employed scales on which little or no psychometric information was available. The Rizzo et al. indices have been administered to a wide range of occupations, including secretaries, nurses, librarians, professional level managers and non-managers, utility workers and so on. In general, measures of internal consistency (measured by Cronbach Alpha or Spearman-Brown split-half estimate) range mostly in the 0.70 to 0.80 range, with a range from 0.43 (campus police department employees-Rosenkrantz, Luthans & Hennessey, 1983) to 0.92 (professional-level employees-Miles & Perreault, 1976). Schuler, Aldag, and Brief (1977) have also reported test-retest reliabilities of 0.44 for RC and 0.40 for RA over a seven-month interval.

The construct validity data noted by Rizzo et al is also supported by most other available studies. For example, Stead and Scamell (1980) reviewed a number of studies which found that higher levels of RC and RA were associated with lower job satisfaction. They then reported their own findings which demonstrated the same phenomena even when the effects of RC and RA on each other were partialled out of the correlational analysis. Other work has found that RC and RA are negatively related to such variables as organizational commitment (Fisher & Gitelson, 1983), job involvement (Schuler, Aldag & Brief, 1977), tolerance for conflict (Randolph & Posner, 1981),and assertiveness (Scamell & Stead, 1984). In a longitudinal study, Miles (1975) found evidence for causal relationships between RC, RA, and various personal outcomes with strongest support for role ambiguity leading to job dissatisfaction. In addition, RC and RA appear to be associated with higher levels of tension (Bedeian & Armenakis, 1981) and propensity to leave one's job (Bedeian, Armenakis & Curran, 1981). Breaugh (1980) reported similar findings for satisfaction, tension, absenteeism and performance when he compared the Rizzo et al.scales with two other measures

of RA and RC (Lyons, 1971; Beehr, 1976).

The factor structures and psychometric properties of these scales have been focused on as well by a number of investigators. Criticisms have emphasized such issues as the modest relationships between RC and RA and various outcome measures implying a potential lack of validity (Breaugh, 1980), some sharing of common variance between RA and a measure of social desirability (Rosenkrantz et al., 1983), and a confounding of RC and RA with positive and negative wording of items (Tracy & Johnson, 1981, 1983). Other work, however, suggests that the scales have adequate construct validity and consistency of factor structure across samples (Schuler et al., 1977; Schwab, Iwanicki & Pierson, 1983) and that the scales are not artifacts of item wordings (House, Schuler & Levanoni, 1983). The preponderance of the evidence suggests that the RA and RC scales of Rizzo et al. are reasonable measures of their targeted constructs.

Teacher Occupational Stress Factor Questionnaire (TOSFQ): Clark (1980)

Clark's (1980) scale, while included in an unpublished doctoral dissertation, has stimulated a degree of research among those studying samples of teachers. As originally developed, the TOSFQ was a 30-item questionnaire containing 5 factors: Professional Inadequacy, Teacher-Principal Professional Relationships; Collegial Relationships; Group Instruction; and Job Overload, with the alpha reliabilities for these factors ranging from 0.93 to 0.98. Moracco, Danford, and D'Arienzo (1982) and Foxworth, Karnes, and Leonard (1984) have re-factor analyzed the scale, deriving 5 and 4 factors, respectively, which differ somewhat from the original set but which also have relatively high reliabilities (0.80 to 0.92). Using the factors that they had previously observed, Moracco, D'Arienzo, and Danford (1983) found not only high reliabilities (0.83 to 0.91) but some construct validity support as well. They

reported that teachers who indicated an unwillingness to become a teacher if they could live their lives over again (a measure of dissatisfaction with career choice) showed higher stress levels on all 5 factors of the TOSFQ. Further psychometric work on this measure has yet to be performed, however.

It should be noted as a follow-up to this scale that Butcke, Moracco, and McEwen (1984) have selected items from the TOSFQ and other sources to construct a Counselor Occupational Stress Inventory (COSI). Two studies by these authors have suggested 6 factors for the COSI, similar in content to those of the TOSFQ, with internal consistency coefficients ranging from 0.81 to 0.95. Validational information for this scale is not available at this time.

Nursing Stress Scale (NSS)-Gray-Toft and Anderson, 1981a

In recognition of the specific stresses undergone by nursing staff, the NSS was developed to determine reactions to some of the situations experienced by this occupational group. The scale consists of 34 items which have been factor-analyzed into 7 subscales (death and dying, conflict with physicians, inadequate preparation, lack of support, conflict with other nurses, work load, uncertainty concerning treatment). Respondents indicate for each situation the frequency with which it occurs on his/her unit, from 0 = never to 3 = very frequently. Total scores on the NSS have ranged from 80.8 to 94.10, varying by type of unit from which subjects were recruited (Gray-Toft, 1980; Gray-Toft & Anderson, 1981a, b).

Various measures of reliability were provided by Gray-Toft and Anderson (1981a) for the whole NSS and the individual subscales. For the total scale these were 0.79 (Spearman-Brown), 0.79 (Guttman split-half), 0.89 (Cronbach alpha), 0.89 (standardized item alpha) and 0.81 (test-retest over two weeks). All but 2 subscales (lack of support and conflict with physicians) achieved average internal consistencies of 0.70, and 3 scales had less than 0.70 test-

retest coefficients. Some evidence for validity is available, indicating that total NSS is negatively related to job satisfaction and positively correlated to state and trait anxiety and job turnover rates (Gray-Toft & Anderson, 1981b). While this measure has promise as a stress index for a particular job category, its value needs to be assessed by other groups of investigators.

Other Scales: Structure and Demands of the Job

The work of Parasuraman and colleagues has produced an instrument designed to measure situational stressors. While the dimensions studied have varied somewhat across studies, there appears to be a core set of subscales. Specifically, these are measures of role frustration (alpha = 0.72 to 0.76), interunit conflict (alpha = 0.74 to 0.84), technical problems (alpha = 0.68 to 0.70) and work overload (alpha = 0.78), most of which are 3-to 4-item scales (Parasuraman & Alutto, 1981, 1984; Parasuraman, Drake & Zammuto, 1982). These factors have been examined in light of organizational characteristics and job level among manufacturing employees (Parasuraman & Alutto, 1981, 1984) and related to job level, type of care, and shift among nurses (Parasuraman et al., 1982).

Karasek (1979) employed a 7-item scale of job demands (requirement to work fast, hard, etc.) which showed an alpha reliability of 0.64 and was significantly related to symptoms of exhaustion and depression in an American sample of workers. A 2-item version of that scale (hectic and psychologically demanding job) showed similar relationships in a comparable Swedish group (coefficient of reproducibility = 0.94, coefficient of scalability = 0.78). Also, this 2-item measure was significantly related to the development of symptoms of coronary heart disease in the Swedish sample (Karasek, Baker, Marxer, Ahlbom & Theorell, 1981).

The Rahim Organizational Conflict Inventory (Rahim, 1983) is a 24-item

measure with 3 8-items subscales which assess intrapersonal, intragroup and intergroup conflict. Various measures of reliability (Cronbach alpha, Spearman-Brown, Guttman lambda, Kristof's unbiased) all ranged from 0.79 to 0.83 for the subscales, and test-retest reliability varied from 0.74 to 0.85. The subscales were negatively correlated with measures of organizational climate and effectiveness, and discriminated among top, middle, and lower organizational levels, conflict increasing as level decreased. Finally, the scales were found to be reasonably unrelated to measures of social desirability and response bias.

Supervisor Behavior

It seems reasonable to hypothesize that the behavioral style of one's immediate supervisor might serve to buffer or aggravate the possible health consequences of stressors in the workplace. Frequently, it has been established that supervisor's behavior influences employee's job performance, job satisfactions, and role conflicts. Cooper, in summarizing over 40 occupational stress studies, concludes that the quality of the relationship with one's boss is one of the most commonly recurring strong determinants of job distress vs. job satisfaction (C.L. Cooper: Personal communication).

Initially, 3 scales were considered for possible review: 2 by Fleishman, the Leader Opinion Questionnaire (LOQ) (Fleishman, 1969) and the Supervisory Behavior Description Questionnaire (SBDQ) (Fleishman, 1972), and the Leader Behavior Description Questionnaire (LBDQ) by Stogdill (1963). The LOQ is a self description by supervisors as to how they should behave, but does not reflect the employee's perspective. The SBDQ elicits employee's descriptions of their supervisors, but there has been debate about its construct validity (e.g.) Szilagyi & Keller, 1976) and it is considerably longer than the LBDQ. These have been reviewed in detail in Cook, Hepworth, Wall and Warr (1981).

Both the scales by Fleishman and that by Stogdill have been widely used in employee relations and group performance studies, particularly the latter. Among the citations to the Fleishman scales, only one appears from the title to include a health measure (Wiener, Vardi & Muczyk, 1981).

Science Citation Index searches for Stogdill's book which presented the LBDQ for scientific use reveals 115 citations from 1972 to 1984 in the social science search file and 15 references in the more medically restrictive science search file. (Many of these 15 were included in the first file). It is obvious from this popularity of citation that the Stogdill scale has been widely used, but the citations indicate that the research is primarily in organizational

behavior and occupational psychology. The LBDQ scales have good internal consistency reliabilities (Kudar-Richardson formula) reported from several studies (see Cook et al, 1981). The values range from 0.54 to 0.87, with the majority in the .70's. Many studies have used only selected subtests of the LBDQ, with Consideration and Initiating Structure being the most popular. Validity of several of the scales has been confirmed by factor analyses and correlations with related constructs.

Only 2 of the 115 references suggested that a health outcome variable might have been included in the research (Cook & Rousseau, 1953; and Rose, Jenkins & Hurst 1978). In the study of Air Traffic Controllers many health outcome variables have been measured. Very few of these were correlated significantly with any of the 3 scales of the LBDQ selected for inclusion in the study: Initiation of Structure, Tolerance of Freedom, and Consideration. The final project report for the ATC Health Change Study did not perform the kinds of interactive analyses which would have the greatest likelihood of determining whether these leadership behavior dimensions intervened or modified other observed relationships between stressors and health outcomes. The LBDQ scales, however, did not appear to have much utility as independent variables predicting negative health changes.

Given the more challenging findings observed with other variables, we do not give a high priority to future inclusion of employee's perceptions of leader behavior as an important component in the stress-strain equation as it relates to health outcomes.

Person-Environment Fit

Some investigators have not focused solely on characteristics of either the person or the work environment, but rather on how well these factors match each other, a perspective labeled person-environment (P-E) fit. As attention is placed on how well people and settings match, P-E fit differs from interactional models which examine the impact of one variable on the fluctuation of another (Van Harrison, in press). The major hypothesis related to this construct is that lack of fit is a stressor which can lead to observable indices of strain. This lack of fit may manifest itself primarily in the physical environment realm (e.g., speed of an assembly line exceeding the capability of the workers) or in the area of perception and needs (e.g., high perceived ambiguity of role demands versus the level of expected/desired role clarity). Since the focus of this review is on psychometric assessments, the latter example is of more pertinence here. It should be noted that there is no specific scale or questionnaire that is used to measure P-E fit. Rather, this determination is made by a comparison of assessments of the person and the environment which gives the investigator an estimate of the discrepancy between them. Thus, discussions of reliability and validity of the technique itself are not appropriate, as the quality of this assessment depends on the quality of the scales utilized in the comparison.

The primary method of P-E fit determination is to obtain ratings from subjects of the amount of a factor they perceive in their environment and the amount they feel is optimal. Subtraction of the desired level from the actual (perceived) level gives an index of the lack of fit, which can range from minus (less factor than desired) to 0 (perfect fit) to plus (more factor than desired). Examples of relevant factors include job complexity and workload, which Caplan et al (1975) and Van Harrison (1978) noted were related to lower levels of depression and job dissatisfaction respectively when P-E fit was 0 and

higher levels when fit was in positive or negative ranges. Clearly, to perform this analysis one needs to have indices of P and E which use the same metric so that one can carry out this subtraction procedure. One may plot this difference against the available strain measure or correlate the extent of misfit with strain to determine its independent contribution outside of the effects of P and E considered separately (Van Harrison, 1978). A somewhat different technique is exemplified by Matteson and Ivancevich (1982) who characterized both their subjects and these peoples' work environments as Type A or Type B and then examined the relative standings of the combinations of subjects and environments over a number of measures of strain. This approach does not require utilization of the same scaling procedure, but does suggest that mismatches between personal and environmental characteristics will generate stress and eventually strain.

Several considerations must be kept in mind with regard to use of this technique. One is that subjects' perceptions of their work environment may not be the same reflections of reality as others report, and these measurements should not be construed as "objective" or "true" assessments. A related point is that because of the diversity of subjects and environments, factors which may assume great importance in some settings may be irrelevant in others. Thus each P-E fit analysis may have a discrete set of study variables, and the importance of these for the observed outcome measures should be analyzed along with their level of misfit. Further, efforts must be made to ensure that truly parallel, commensurate measures of objective and subjective job environments are developed and employed in P-E fit research, otherwise the comparisons that are made will reflect discrepancies in conceptualization rather than in level of fit. A final recommendation would be to examine the measurement of and interrelationships among preferred level of the environmental factor, the actual expression of the

factor in the setting, and the real capacity of the individual to respond to that factor and the task at hand. Generally speaking, then, the technique of P-E fit assessment has interesting theoretical and practical implications which deserve further research employing many of the instruments discussed in this review. (See Caplan, 1983; Kahn, 1981; and Van Harrison, 1978 in press for more extensive discussions of this topic.)

Stressors Due to Changes in Work

Modifications in the work experience, particularly if they are substantial changes, can become powerful sources of stress for individuals. Such situations as job loss, job mobility, and other changes in job status have been associated with a number of stress-related outcomes (e.g., Kasl, 1979). However, studies of these phenomena have not generally developed specific psychometric instruments to assess either the perceived characteristics of the stressor or individual responses to these situations. It is likely that indices designed to address specific aspects of these stressors would be of considerable value. For example, evaluation of the fear of job loss (prior to the actual event) would enable investigators to explore the behavioral correlates of this emotional reaction which has assumed great importance, particularly in Europe. One attempt to address the issue of changing working conditions was made by Rose, et al (1978) in their study of air traffic controllers. They devised a 13-item scale on changes within the work setting, assessing change in activities, personnel and level of stress during the previous 9 months. They then related this information to outcomes obtained prospectively over the next 27 months. Rose et al. found that change in the workplace was the best predictor, from among the various psychosocial factors studied, of mild and moderate illness and the second-best predictor of accidents and injuries. Although this line of research has not been followed up to any extent, these data imply the importance of this issue for predicting various health outcomes and for understanding the impact of variations in work circumstances generally.

Changes in patterns of work within one's job may also be considered stressful, and a major factor in this area is shift work. The assessment of shift changes is simple and straightforward, with either employer records or self-reports providing accurate data. There has been much attention to the

impact of changing shifts on physiology, psychological effectiveness, and general health. The best concise review that we have found on this topic is by Tasto, Colligan, Skjei, and Polly (1978).

This review and other subsequent research papers present mixed conclusions regarding the nature and severity of adverse consequences of working different hours of the day. In general, where differences are observed, persons regularly working daytime shifts are the most "normal" in physiological and psychological functioning and health status. Persons on afternoon and night shifts on a regular basis are less healthy in some studies but not in others. Another point of general consensus is that persons who work changing shift patterns are more likely to show physiological deregulation, more physical symptoms and, interestingly, more accidents. This has been particularly well documented for nurses on changing shifts (Smith, Colligan, Frockt & Tasto, 1979).

For persons working on changing shifts, sleep disturbance is quite commonly observed with a decrease both in the quality and quantity of sleep. This has been observed in a variety of European and U.S. studies. Normal appetite, regularity of meals, enjoying of meals, and regularity of elimination are also generally decreased in persons with changing shifts. Medication has differential effectiveness when taken in the morning versus when taken in the evening. A variety of psychological and interpersonal effects, particularly interference with family activities, has also been observed in persons working night shifts or rotating shifts.

In summary, shift work appears to be a source of job stress, its physiological and psychological impacts have been well documented, and it can be simply and reliably measured. Specific measures of stress related to this factor have not been developed but may be of assistance in deriving a more detailed perspective of this job characteristic.

Non-Work Stressors

Life Change, Life Stress

Several investigators have recognized the importance of general stressful life events or life changes in the occupational setting (e.g., Sarason & Johnson, 1979). The influence that life events may have on job satisfaction, absenteeism and so forth stems from the voluminous literature on the relationship between life events and physical and mental well-being. Seminal work in this area was begun by Holmes in the late 1950s.

In 1967 Holmes and Rahe published a 43-item life events change scale (Social Readjustment Rating Scale) that assesses the magnitude of adjustment required for life changes experienced by individuals. Their work has provided the impetus for thousands of studies of life stress and health and has provoked the development of other life event scales such as the Life Experiences Survey (Sarason, Johnson, & Siegel, 1978), the Recent Life Event Scales (Paykel, Prusoff, & Uhlenhuth, 1971), the PERI Life Events Scale (Dohrenwend, Krasnoff, Askenasy, & Dohrenwend, 1978), and others.

Several general points should be made about these scales before individual reviews of them are made. Two issues concern item content. First, these scales are postulated to measure stressful events that may occur throughout a lifetime. Further, these occurrences may play an etiologic role in the development of disease. However, some of items appear to measure symptoms (or responses to event) rather than discrete events (e.g., Change in Social Activities, Holmes & Rahe, 1977). Thus, a criticism of these scales is that they are measures of both presumed etiology and outcome, making it difficult to interpret their relationship to physical and psychological health outcomes. The second issue is primarily a criticism of Holmes and Rahe. Holmes and Rahe consider life changes to be stressful regardless of the desirability of the change, whether the change is positive, negative, or ambiguous. All types of events are summed together to

determine life stress. Several investigators (e.g., Mechanic, 1972, Sarason, De Monchaux & Hunt, 1975) have argued that the impact of negative life changes may be different from that of positive life changes; negative events may have a more detrimental effect and, consequently, be a better representation of life stress.

The issue of estimating the magnitude of life change, readjustment, or stress has been carefully laid out by Cleary (1981). One controversy has been over whether to use group standard ratings of adjustment (Holmes & Rahe, 1967), individual ratings (e.g., Paykel et al., 1971), or unweighted ratings (a count of single life events). The consensus at present is that there is little difference among the various weighting procedures. For example, Grant, Sweetwood, Gerst, and Yager (1978) found that there was little difference in scoring methods when they correlated life change with psychiatric symptoms. The correlations were 0.58 for group ratings, 0.56 for individual ratings, and 0.48 for unweighted scores.

In discussing scale properties for this review, 2 comments need to be made about reliability. Tausig (1982) has effectively argued that measures of internal consistency and factor analyses of life event scales may be questionable. The experience of a particular life event may be independent of the experience of another event in the scale. Therefore, the scale may not have internal statistical coherence or internal structure. On the other hand, researchers have conducted factor analyses and reported meaningful components within the life events scale, suggesting that some events may not be completely independent of each other. Scale consistency and factor analyses are reported in this review with the aforementioned point in mind.

Finally, caution is urged in relying upon reported test-retest reliabilities. Many reliabilities are calculated for total scores rather than for individual events. Thus, it may appear that the scale is highly reliable over time when, in fact, the stability of reporting the occurrence of the same

event may be low. Recall may also be an important factor, as Jenkins, Hurst, and Rose (1979) reported forgetting from the first test to the second test 9 months later to be as high as 46% on individual events.

Social Readjustment Rating Scale - Holmes and Rahe (1967)

In 1964, Holmes and Rahe developed a questionnaire (Social Readjustment Rating Questionnaire) assessing the amount of personal adjustment required when subjects had experienced certain life change events. The questionnaire was revised and published in 1967 as the Social Readjustment Rating Scale (SRRS). This 43-item scale measures the effort necessary to adjust to a life change event, whether the event is negative (e.g., death of a spouse) or positive (e.g., marital reconciliation with mate). Another 43-item version (Schedule of Recent Event, SRE) provides a score of the total number of events that have occurred without taking into account the magnitude of adjustment required by each event.

The more widely used of the 2 scales is the SRRS. It was developed by having 394 subjects quantify the amount of adjustment each life change event would require using marriage, which was assigned a value of 500, as a standard; the mean score for each event was then divided by 10. The result was that the 43 events were ranked with death of a spouse receiving the highest mean value of 100 and minor violations of the law the lowest of 11. Individual weighted event scores are summed to form a life change unit index. Holmes and Rahe (1967) correlated scale scores across sex, age, marital status, race, education, religion, and generation groups. With the exception of race (0.82) correlations were in excess of 0.90, suggesting that there is agreement in scoring across a variety of discrete samples.

Psychometric properties of the scale have been provided by Lei and Skinner (1980). They administered both the SRE and the SRRS to 353 alcohol and/or drug

abuse patients. They reported internal reliabilities (Cronbach alphas) of 0.80 for the SRE and 0.72 for the SRRS. In addition, they reported a correlation of 0.97 between the SRE and the SRRS. When they factor analyzed the SRE, they found the scale to consist of six components: Personal and Social Activities, Work Changes, Marital Problems, Residence Changes, Family Issues, and School Changes. Internal reliabilities (alphas) of these factors range from 0.91 to 0.95. On the other hand, Hurst, Jenkins, and Rose (1978) reported a coefficient alpha correlation of 0.51. Gerst, Grant, Yager, and Sweetwood (1978) examined test-retest reliability of the SRRS in 213 employees of a VA hospital. They found that reliability decreased over time; the correlation at 6 months was 0.83, at 12 months was 0.69, and at 24 months was 0.59. They correlated total scores at each testing interval rather than number of same events reported at each testing. Other reports of test-retest reliability range from 0.50-0.75 over 1 to 2 years (Rahe, Riemo, Bennett & Siltamer, 1974) to 0.87-0.90 over one week (Hawkins, Davis & Holmes, 1957).

While the majority of the work with the Holmes and Rahe scale has been with illness, it has also been used as a measure of stress in the occupational setting. For example, Pardine, Higgins, Syeglin, Beres, Kravitz & Fotes (1981) used the SRRS as a measure of stress off the job and evaluated job satisfaction as a function of off-and on-the-job stress. They found that the SRRS was significantly related to job satisfaction. Moreover, respondents who reported high off-the-job stress showed significantly more absenteeism from work than respondents reporting a low degree of stress off the job.

Life Experiences Survey - Sarason, Johnson and Siegel (1978)

The Life Experiences Survey was developed in response to 2 concerns with the Holmes and Rahe scale (1967). An underlying assumption of the SRRS is that life changes are stressful without regard to the desirability of the event. The Life

Experiences Survey asks subjects to rate the desirability of each event experienced as either positive or negative. The second concern is with the quantification of life changes. Since individuals may adjust differently to life events, standard groups ratings of adjustment may not accurately reflect their adjustment. In the Life Experiences Survey, subjects rate their own degree of adjustment on a 7-point Likert scale.

This scale contains 57 events, of which 34 overlap with the Holmes and Rahe's scale. Ratings on the 7-point Likert scale range from -3 to +3. Total scores are generated for positive, negative, and total life change. When the scale was constructed (sample was 345 students enrolled in a psychology course), the observed means for males were 6.87 (s.d. 5.97), 4.66 (s.d. 4.36), and 11.53 (s.d. 8.03) and for females were 6.71 (s.d. 5.51), 5.64 (s.d. 6.43), and 12.35 (s.d. 8.82) for positive, negative, and total scores, respectively. Six week test-retest reliabilities using 2 samples of students were 0.19 and 0.53 for the positive score, 0.56 and 0.88 for the negative score, and 0.63 and 0.64 for the total score. The reviewers are unaware of any reported measures of internal consistency.

Sarason and Johnson (1979) conducted a study of life stress and job satisfaction in 44 Navy men. The correlated positive and negative life changes with the Job Descriptive Index (Smith, Kendall & Hulin, 1975), which measures 5 aspects of satisfaction. Positive life changes correlated significantly only with satisfaction with promotion opportunities (-0.42); level of negative life changes was significantly correlated with work (-0.37), supervision -(0.31), and pay (-0.31) satisfactions.

Recent Life Event Scale - Paykel, Prusoff and Uhlenhuth (1971)

This 61-item life events scale was derived primarily from the Holmes and Rahe scale (1967). The major deviations from Holmes and Rahe in this scale are

that each life event experience is rated on a 0-20 scale (least upsetting to most upsetting), that bi-directional items are split into 2 (thus, "beginning or ceasing formal schooling" becomes separate items), and items are specifically defined (e.g. serious illness is defined as either involving hospitalization or a month of absence from work). In a survey of 373 subjects (213 psychiatric patients and 160 relatives), Paykel et al., report mean item scores as high as 19.33 (s.d. 2.22) for death of child, followed by 18.76 (s.d. 3.21) for death of spouse, and as low as 2.94 (s.d. 3.75) for child married with subject's approval. Total scores are similar across age, sex, social class, race, religion, and marital status groups (range of correlation was 0.980-0.998). Paykel (1983) reports a test-retest reliability of 0.95 for specific events and a reliability of 0.85 for month of occurrence within a 6 month period. Cleary (1981) cites an internal reliability (coefficient alpha) of 0.51 and attributes the low internal consistency to a low item redundancy within the scale.

The PERI Life Events Scale - Dohrenwend, Krasnoff, Askenasy and Dohrenwend (1978)

Within the Psychiatric Epidemiology Research Interview (PERI) is a 102-item scale of stressful life events. Like the Holmes and Rahe scale (1967), standardized group ratings are used to weight the events; however, the group ratings were derived from a probability sample of judges from the general public. Dohrenwend et al. contend that their group ratings are more representative of the general population then those of Holmes and Rahe who used a sample of convenience. The PERI Life Events Scale assesses quality of events experience as desirable, undesirable, or ambiguous. Events in the list tend to be objective rather than subjective (e.g. divorce rather than trouble in your marriage) and many have been related to psychiatric illness. There appears to be no reliability data available on the scale nor data on the scale's stability

across different groups of people (cf, Miller, 1981).

Summary

Kale and Stenmark (1983) compared the SRRS, the Life Experience Survey, and the PERI Life Events Scale in a sample of 127 employees. Means (unweighted and weighted) are 13.21 (s.d. 9.29) and 492.43 (s.d. 326.08) for the SRRS, 14.13 (s.d. 8.30) and 405.57 (s.d. 269.02) for the PERI Life Events Scale, and 9.40 (s.d. 5.42) and 19.34 (s.d. 12.41) for the Life Experiences Survey. Correlations among the 3 scales ranged from 0.67 between the PERI and Life Experiences Survey to 0.81 between the SRRS and the PERI. They correlated each life event scale with the Symptoms Checklist-90 (Derogatis, Lipman & Covi, 1973) and found the correlations to range between 0.34 for the PERI to 0.45 for the Life Experience Survey. It appears that these 3 scales are similar in content and in concurrent validity, at least in terms of psychiatric symptoms.

IV. Psychosocial Measures of Work Strain

Job-Referenced Psychological Outcomes

The primary self-report measures we have identified as being outcomes of the stresses reviewed above are burnout, tedium, job tension and job satisfaction. Clearly the latter variable has captured a greater share of attention in the literature, again perhaps due to the backgrounds of many of the investigators in this field. After surveying the data on these factors we will consider measures of general affective states which also may be relevant as indicators of work strain.

Burnout, Tedium, Tedium Job Tension

Maslach Burnout Inventory (MBI) - Maslach & Jackson, 1981

The concept of burnout reflects professional and emotional disengagement from one's occupational activities following prolonged stress and strain in that environment. The MBI is the most commonly used measure of this depletion of coping resources. It consists of 22 items related to the major factors of emotional exhaustion, depersonalization, and personal accomplishment. (An additional 3 items initially proposed for a factor of personal involvement were found to have inconsistent intercorrelations and are generally not used.) Each of these items is rated on their frequency and intensity in the person's occupational experience, frequency being rated from 0 = never to 6 = everyday and intensity from 0 = never to 7 = major or very strong. The crossing of the 3 factors by these 2 rating scales yields scores for 6 subscales. Internal consistency reliabilities reported by Maslach and Jackson (1981) ranged from 0.71 to 0.90 for these subscales, and test-retest reliabilities over 1-to 4-week intervals varied from 0.53 for emotional exhaustion: intensity to 0.82 for emotional exhaustion: frequency, with 3 of the other 4 coefficients between 0.68 and 0.80. Comparable reliabilities were noted by Beck and Gargiulo (1983),

who also found split-half reliabilities of 0.74 and 0.81 on frequency and intensity, respectively.

In the area of validity, Maslach and Jackson (1981) reported moderate correlations in the expected directions between MBI subscales and measures of job satisfaction, family disruption, sleep and substance abuse problems. Concurrent validity was estimated by Beck and Gargiulo (1983) through moderate correlations between the 3 subscales and independent behavior ratings by spouses and co-workers, and with scores on a job diagnostic survey. Stout and Williams (1983) noted similar findings with job satisfaction and health problems, and Lewiston, Conley and Blessing-Moore (1981) found higher levels of emotional exhaustion and lower depersonalization among cystic fibrosis caregivers than among their academic counterparts.

Although the factor structure of the MBI has appeared to be fairly consistent across samples (Belcastro, Gold & Hays, 1983; Iwanicki & Schwab, 1981), these and other authors (e.g., Golembiewski, Munzenrider & Carter, 1983) have noted the high correlations between the frequency and intensity dimensions (average of 0.87 in Iwanicki & Schwab, 1981) and have suggested rating the factors on either frequency or intensity (Iwanicki & Schwab, 1981) or on the extent to which each statement is characteristic of the respondent (Golembiewski et al., 1983). Further research is required to determine the most appropriate technique, but current evidence suggests that the MBI can be a reliable tool to assess the burnout construct.

The Tedium Scale - Pines, Aronson and Kafry, 1981

Tedium, as defined by Kafry and Pines (1980), is the experience of physical, emotional, and mental exhaustion, a similar definition to that of burnout. The Tedium Scale is a 21-item questionnaire which measures this construct by having subjects indicate on a 7-point rating scale (1 = never, 7 =

always) the frequency of occurrence of symptoms of exhaustion. Internal consistency of the scale is high, as noted by Pines et al. (1981) (0.91, 0.93) and Duxbury, Armstrong, Drew, and Henly (1984) (0.92). Group means reported by Duxbury et al (1984), Stout and Williams (1983) and Kafry and Pines (1980) range between 3.0 and 3.45 (total score/number of items) and test-retest reliability has been estimated at 0.89 for one month, 0.76 for 2 months and .66 for a 4-month interval (Pines et al., 1981).

Some evidence for validity comes from negative correlations of the Tedium Scale with job satisfaction (Duxbury et al., 1984; Pines et al., 1981; Stout & Williams, 1983), and from positive relationships with health problems (Stout & Williams, 1983), desire to leave one's job and negative feelings toward clients (Pines et al., 1981). While this scale has not been utilized as much as the Maslach Burnout Inventory, it appears to be of potential value as a global measure of occupational tedium or burnout.

Other Scales: Reactions of Anxiety and Tension

Tosi (1971) proposed a 4-item measure of job threat and anxiety, related to evaluation concerns and potential job loss. No psychometric data are available, but the scale has been significantly related to role conflict and ambiguity, job satisfaction, and job participation (Tosi, 1971; Hamner & Tosi, 1974).

Rizzo et al. (1970) discuss their use of an anxiety-job tension scale made up of 17 items, some selected from the Taylor Manifest Anxiety Scale. While not all of the items inquire directly into tension on the job, the measure was conceptualized as a reflection of work-related stressors. Whereas Rizzo et al. (1970) and House and Rizzo (1972) used a 17-item version of this scale, other investigators have employed 13-item (Miles & Perreault, 1976) and 18-item (Brief & Aldag, 1976) forms, somewhat complicating the psychometric evaluation. Nonetheless, internal consistency reliabilities range primarily from 0.72 (House

& Rizzo, 1972) to 0.89 (Miles & Perreault, 1976) with a test-retest reliability of 0.79 over 4 months (Miles, 1975). The scale has been related to measures of role conflict and ambiguity (House & Rizzo, 1972) and conflict orientation of the individual (Miles & Perreault, 1976).

Keenan and McBain (1979) developed an 8-item Tension at Work scale in which subjects note the presence of signs of anxiety at the end of a typical work day. The Cronbach alpha reliability of this measure has been found to be 0.85 (Keenan & McBain, 1977) and 0.83 (Keenan & Newton, 1984) with mean scores of 17.6 and 19.8 respectively (1 - 40 possible range). This measure has also been related significantly to role ambiguity and overload and negatively to job satisfaction (Keenan & McBain, 1979; Keenan & Newton, 1984).

The Emener-Luck Burnout Scale (ELBOS - Emener, Luck & Gohs, 1982) is a 30-item instrument with 6 subscales designed to tap various aspects of the burnout construct. The subscales are general work related feelings (10 items), job related feelings about self (4 items), work-work environment provisions (6 items), negative responses from people within the work-environment (2 items), dissonance between self-concept and self-others-concept (4 items), and career/job alternatives (2 items), plus 2 filler items. Reliabilities were not reported for each scale, but a Cronbach alpha of 0.88 for the total scale was observed. The authors report some evidence for criterion related validity, in that moderate correlations were found between items, the total score and a criterion measure, which was subjects' statement of the extent to which he/she was experiencing burnout. The scale was developed on a sample of rehabilitation counselors, but the items are not specific to that occupation.

An 11-item burnout scale was developed by Ford, Murphy, and Edwards (1983) to assess this construct among corporate and human service professionals. Five subscales were originally derived through factor analysis, these being a winless

scale, a supportless-others scale, a controlless scale, a fatigue scale, and a supportless-organization scale, all consisting of 2 or 3 items and ranging in reliability from 0.67 to 0.82. A second sample showed a two-factor solution, however, defined as emotional exhaustion and supportless-organization (alpha = 0.86 and 0.73 respectively). Both sets of factors were negatively correlated with job satisfaction and measures of support, and positively related to role ambiguity. The stability of the factor structure of this measure clearly needs to be established through further research.

In sum, a number of measures of job tension and burnout exist, and while most have reasonable levels of reliability, the relative lack of research employing these scales in a variety of settings does not allow much generalization of the reported results beyond the studied samples. More data collection utilizing these measures, along with their further refinement and development of new techniques, are clearly warranted.

JOB SATISFACTION

Workers' satisfaction with their jobs has preoccupied investigators of occupational stress and strain for over 40 years. More than 3000 studies have used measures of job satisfaction (Locke, 1976) and many papers have been written about its meaning and measurement (e.g. Evans, 1969; Locke, 1976; Straw, 1984; Wanous & Lawler, 1972). Whereas the focus of the research in the 1960s and early 1970s was on the methodological considerations in developing theory-based measures of job satisfaction, the current trend is to view job satisfaction as a theory-free affective variable (Straw, 1984).

Measures of job satisfaction can be divided into 2 broad categories: overall job satisfaction and specific aspects of job satisfaction. Specific aspects include discriminable features of the job such as pay and co-workers. Overall measures of job satisfaction assess general evaluation of the job or work situation. Sometimes, overall job satisfaction measures are based on the summation of satisfaction scores of specific aspects of the job. The virtues of each type of job satisfaction measure lie within the objectives of the study for which they are used. Apart from the research context, it is difficult to say which type of measure is better. For this reason, all job satisfaction scales are reviewed in one section.

There are many job satisfaction scales available; however, few scales have been widely used or have psychometric information available for them. This review concentrates on the 13 most widely used scales of job satisfaction and mentions, only briefly, an additional 27 scales. The current trend appears to be to use either 1-item measures of job satisfaction (e.g. How satisfied are you with your job?) or simple additive measures of specific aspects of job satisfaction. In general, the three most popular scales are the Job Descriptive Index (Smith, Kendall, and Hulin, 1969), the Minnesota Satisfaction

Questionnaire (Weiss, Dawis, England, and Lofquist, 1967) and facet-specific job satisfaction (Quinn and Staines, 1979).

Overall Job Satisfaction - Hoppock (1935)

Hoppock (1935) probably developed the first measure of overall job satisfaction. His scale consists of 4 items measuring (a) how well you like your job, (b) how much time you feel satisfied with your job, (c) how you feel about changing your job, and (d) how you compare with other people in liking your job. Each item is scored from 1 to 7; an overall rating is obtained by summing the individual scores. The range of overall job satisfaction is between 4 and 28 with average reported mean values between 15.87 (s.d. 5.08) and 21.25 (s.d. 2.73) (McNichols, Stahl & Manley, 1978).

The corrected split-half reliability coefficient on 301 subjects was 0.93 (Hoppock, 1935). More recent estimates of the scale's reliability have been lower, Cronbach alphas between 0.76 and 0.89 have been reported (Allen & Keavenly, 1981; Dunne, Stahl & Melhart, 1978; McNichols et al., 1978).

In attempting to validate their job satisfaction scale, Brayfield and Rothe (1951) had 91 students who were taking a night class complete their scale and Hoppock's; the product-moment correlation between the scale scores was 0.92. Correlations, though, between Hoppock's overall job satisfaction and specific measures of job satisfaction, such as pay and responsibility, are somewhat lower. In a survey of 286 university faculty members, Allen and Keavenly (1981) administered the Hoppock scale of overall job satisfaction and the Minnesota Satisfaction Questionnaire (Weiss et al. 1967) which measures 4 aspects of intrinsic job satisfaction. They reported a correlation of 0.64 between overall job satisfaction and overall intrinsic satisfaction. In addition, overall job satisfaction correlated 0.54 with creativity satisfaction, 0.59 with ability utilization, 0.55 with responsibility satisfaction, and 0.63 with achievement

satisfaction. McNichols et al., (1978) correlated overall job satisfaction (Hoppock's scale) with the 5 subscales of job satisfaction from the Job Descriptive Index (Smith et al., 1969) in a sample of 628 military personnel. Overall job satisfaction correlated most highly with type of work (0.73), least with pay (0.16), and moderately with promotion opportunities (0.40), supervision (0.46), and co-workers (0.34).

Overall Job Satisfaction - Brayfield and Rothe (1951)

Brayfield and Rothe (1951) believed that job satisfaction is an attitude and should be measured using an attitude scale. Their scale consists of 18 items with a 5-point Likert response format. Each item is scored from 1 to 5 and summed. The range of scores is 18 to 90 with a undecided or neutral point of 54.

The original scale was tested with a group of 231 female office employees. The mean score was 63.8 (s.d. 9.4) and the reliability coefficient (Spearman-Brown) was 0.87. The scale was tested again on a second sample of college students yielding a mean score was 70.4 (s.d. 13.2). Other reported estimates of reliability are 0.80 (Cronbach alpha; Vecchio, 1981), 0.87 (Lopez & Greenhaus, 1978) and 0.86 and 0.82 (Cronbach alphas, Snizek & Little, 1984). One study (Orphen, 1978) examined test-retest reliability of overall job satisfaction scores over 12 months; the correlation was 0.27.

Several investigators have correlated overall job satisfaction with other scales of job satisfaction. In a survey of 135 employees from industrial kibbutzim firms (unpaid workers) and 187 employees from private factories (paid workers), Ronan (1977) administered the Job Descriptive Index (Smith et al., 1969) and the Brayfield and Rothe scale. Overall job satisfaction correlated 0.73 with type of work in both groups of workers, 0.30 (unpaid) and 0.27 (paid) with supervision, 0.28 (unpaid) and 0.34 (paid) with promotion opportunities,

0.16 (unpaid) and 0.34 (paid) with co-workers, and 0.18 with pay in the group of paid workers. Hospital employees were studied by Mobley, Homer, and Hollingsworth (1978) in which they found the correlation between overall job satisfaction and personnel turnover was -0.21 and -0.54 with thinking of quitting. Vecchio (1981) studied the relationship of overall job satisfaction to supervisory behavior and working-setting in a sample of 107 employees of manufacturing companies. Overall job satisfaction was positively correlated with supervisory structure (0.35) and consideration from the supervisor (0.34) and negatively correlated with job conflict (-0.18) and ambiguity (-0.27). In the same study, Vecchio administered the type of work subscale from the Job Descriptive Index (Smith et al., 1969); the correlation between type of work and overall job satisfaction was 0.63.

Bullock (1952) - Overall Job Satisfaction

Ten items comprise this overall job satisfaction score. Subjects are asked to rate the following job aspects: 1. how good they think their jobs are, 2. feelings about their jobs, 3. how much of the time they are satisfied with their jobs, 4. what kind of organization they work for, 5. how their feelings about their jobs compare to those of other people, 6. feelings about the work they do, 7. general working conditions that affect their work, 8. feelings about changing jobs, 9. recommending to a friend to take a job in their organization, and 10. how satisfied they are with their jobs. Each item has a 5-point response; items are summed for a total score with a range from 10 to 50. In the original study (Bullock, 1952), the mean score was 39.10. Bullock reported a reliability coefficient (Spearman-Brown) of 0.90 and a test-retest reliability of 0.94.

The scale has been used predominantly by Miles (Miles, 1975, 1976a & b; Miles & Perreault, 1976; Miles & Petty 1975, 1977). In his research Miles has

reported a reliability (Spearman-Brown) of 0.91 (Miles & Petty, 1975) and test-retest reliability over 4 months of 0.80.

The scale appears to have face validity. However, there are no known studies of the scale's validity to the present reviewers. Miles (1976a) has studied the relationship between overall job satisfaction and role ambiguity and role conflict, and found each to be negatively associated with job satisfaction, (-0.49 for role ambiguity and -0.25 for role conflict).

Job Diagnostic Survey - Hackman and Oldham (1975)

Contained within the Job Diagnostic Survey are 2 measures of job satisfaction. There is a short scale of overall job satisfaction and a longer scale measuring satisfaction with specific aspects of the job. Each type of job satisfaction will be discussed separately. Hackman and Oldham (1975, 1976, 1980) have written extensively about their scale; therefore, only summary information will be presented here.

Hackman and Oldham (1975) state that the general satisfaction scale measures the degree of satisfaction and happiness with the job. Five items comprise the overall job satisfaction measure. These items consist of (a.) feeling satisfied with the job, (b.) frequently thinking of quitting the job, (c.) feeling satisfied with the kind of work to be done, (d.) believing that most people on this job are satisfied, and (e.) believing that people on this job often think about quitting. The second and fifth items are reversed scored. Each item is scored on a 7-point Likert scale.

Hackman and Oldham (1975) studied the psychometric properties of their Job Diagnostic Survey in a sample of 658 employees working on 62 different jobs in 7 different companies. The average mean value was 4.62 (s.d. 1.18) with an internal reliability (Spearman-Brown) of 0.76. Other studies have reported a range of mean values of 3.90 (s.d. 1.23) to 5.21 (s.d. 1.14) and reliabilities

from 0.74 to 0.80 (Oldham, Hackman & Stepiner, 1978; Wall, Clegg & Jackson, 1978; Katz, 1978; Hackman, Pearre & Wolfe, 1978; Feldman, 1976, Arnold & House, 1980). Arnold and House (1980) cite the norms for overall job satisfaction to be 4.70 (s.d. 1.07).

Hackman and Oldham (1975) report that overall job satisfaction correlates moderately (from 0.22 with task identity to 0.66 with experienced meaningfulness of the work) with other job characteristics. Arnold and House (1980) studied 120 employees using the Job Diagnostic Survey. They found that overall job satisfaction correlated 0.28 with skill variety, 0.37 with task identity, 0.21 with task significance, 0.41 with autonomy, 0.43 with feedback, and 0.43 with internal work motivation. However, growth satisfaction (see below) correlated even more highly with a low of 0.42 with task significance to a high of 0.61 with autonomy and internal work motivation.

The more widely used job satisfaction measure of the Job Diagnostic Survey is a 14-item scale assessing satisfaction with 5 specific aspects of work. These are pay (2 items),job security (2 items), social (3 items), supervisory (3 items), and growth (4 items). Each item is scored on a 7-point Likert scale; scores are averaged within each sub-scale. In the original study (Hackman and Oldham, 1975) of 658 employees, psychometric information was presented only for social, supervisory, and growth satisfactions. The items on pay and job security satisfaction were added later. The mean value and internal reliability (Spearman-Brown) were 5.42 (s.d. 0.92) and 0.56 for social, 5.28 (s.d. 1.27) and 0.79 for supervisory, and 4.82 (s.d. 1.32) and 0.84 for growth. In a subsequent study by Oldham, Hackman, and Stepiner (1978) of 6930 workers, the means and reliabilities for all 5 sub-scales were reported: 4.16 (s.d. 1.66) and 0.86 for pay, 4.76 (s.d. 1.48) and 0.73 for job security, 5.31 (s.d. 1.02) and 0.64 for social, 4.79 (s.d. 1.57) and 0.86 for supervisory, and 4.74 (s.d. 1.33) and 0.84 for growth.

Oldham et al.,(1978) also reported that overall job satisfaction correlated 0.42 with pay, 0.48 with job security, 0.47 with social, 0.50 with supervisory, and 0.69 with growth.

Overall Job Satisfaction - Taylor and Bowers (1972)

One of the scales contained within the Survey of Organizations Questionnaire (developed by the Institute for Social Research, Ann Arbor, Michigan) is a measure of overall job satisfaction. The measure is comprised of 7 items assessing satisfaction with co-workers, supervision, the job itself, the company, pay, and advancement opportunities (2 items). Responses are on a 5-point Likert scale; overall score is determined by averaging the 7 responses.

Very little information is available on the psychometric properties of the scale. Taylor and Bowers (1972) present some information from group data; they report an internal reliability (Cronbach alpha) of 0.87 and test-retest reliability (no time period specified) of 0.55. Means and standard deviations are unknown.

Attitude Toward the Job - Vroom (1960)

The measure consists of 3 items, each scored on a 5-point scale. The items are: 1. How much do you like supervisory work, 2. How much chance does your job give you to do the things you are best at, and 3. How good is your immediate supervisor in dealing with people. As is obvious from reading the items, the scale was orginally developed to study supervisors rather than job satisfaction (Vroom, 1960). However, Hollon and Chesser (1976) revised the first item to read "How much do you like your current job situation?" and used the 3-item scale as a measure of overall job satisfaction in a survey of 321 college professors. They reported a mean score (the sum of the 3 items) of 11.8 (s.d. 2.3) and an internal reliability of 0.71. Vroom (1960) reported inter-

item correlations of 0.21, 0.07, and 0.25; he also reported a test-retest reliability coefficient (for 6 months) of 0.75.

Job Descriptive Index - Smith, Kendall, and Hulin (1969)

The most widely used measure of satisfaction assessing specific aspects of work is the Job Descriptive Index (Smith, Kendall & Hulin, 1969). This index is an easy to administer and inexpensive measure of 5 areas of job satisfaction that Smith et al. believe to be of primary importance across a variety of conditions. The specific areas of satisfaction are work itself (18 items), pay (9 items), opportunities of promotion (9 items), supervision (18 items), and co-workers (18 items). Each item is a word or phrase to which the respondent replies whether the item is descriptive of his or her job facet. Responses are yes, uncertain, and no; they are weighted 3, 1, and 0, respectively. Item responses are summed for each of the 5 subscales. Smith et al. (1969) recommend that the total scores on the pay and opportunities for promotion sub-scales be doubled so that they will be comparable to the other 3 sub-scales that consist of 18 items each.

Although several investigators (e.g., Hunt, Osborn & Schuler, 1978; Schriesheim, Kinichi & Schriesheim, 1979) have summed the totals of all the sub-scales to form an overall job satisfaction score, Smith et al. do not recommend it. For psychometric information on the overall job satisfaction measure, interested readers should refer to Cook, et al. (1981).

Smith et al. in their original work presented means and standard deviations for each subscale by sex. For male employees the means were 36.57 (s.d. 10.54), 29.90 (s.d. 14.53), 22.06 (s.d. 15.77), 41.10 (s.d. 10.58), and 43.49 (s.d. 10.02) for work, pay, opportunities for promotion, supervision, and co-workers, respectively. For female employees, the means (in the same order) were 35.74 (s.d. 9.88), 27.90 (s.d. 13.65), 17.77 (s.d. 13.38), 41.13 (s.d. 10.05), and

42.09 (s.d. 10.51). Generally, others have reported similar mean values; however, it is difficult to interpret the comparability in mean values on the pay and opportunities for promotion subscales, since some investigators do not report that they doubled the scores.

Numerous investigators have examined the internal reliability of each subscale (e.g. Ivancevich, 1976, 1977; Schriesheim 1979, 1980). Whether the measure of reliability has been a Spearman-Brown, Cronbach alpha, or a Kuder-Richardson, the coefficients within each sub-scale are similar. The range of internal reliability for work is 0.69 to 0.90 with a median coefficient of 0.84; for pay the range is 0.70 to 0.84 with a median coefficient of 0.80; for opportunities for promotion the range is 0.72 to 0.90 with a median coefficient of 0.84; for supervision the range is 0.61 to 0.89 with a median coefficient of 0.87; and for co-workers the range is 0.80 to 0.93 with a median coefficient of 0.88. Smith et al.(1969) examined the internal consistency of each subscale in a survey of 80 male employees. They reported Spearman-Brown coefficients of 0.84 for work, 0.80 for pay, 0.86 for opportunities for promotion, 0.87 for supervisory, and 0.88 for co-workers.

In addition, several investigators have examined test-retest reliability of the sub-scales (Schneider & Dachler, 1978; Downey, Sheridan, & Slocum, 1976; Schuler, 1979; Katerberg, Smith & Hoy, 1977). The only study to examine scale stability for all 5 areas of satisfaction was Schneider and Dachler (1978) in a survey of 541 managers and 306 non-managers. They reported reliability coefficients of 0.61, 0.61, 0.64, 0.46, and 0.47 for work, pay, opportunities for promotion, supervision, and co-workers in the group of managers and 0.66, 0.62, 0.56, 0.45, and 0.58, respectively, in the group of non-managers over a 16 month period.

As mentioned earlier, the sub-scales of the Job Descriptive Index have been correlated with 2 measures of overall job satisfaction (Hoppock, 1935 and

Brayfield & Rothe, 1951). In addition, there have been 3 studies (Herman, Dunham & Hulin, 1975; Newman, 1974; O'Relly, Bretton & Roberts, 1974) in which the Job Descriptive Index has been correlated with Kunin's Faces scale (1955). The range of correlations across the 3 studies has been 0.62-0.74 for work, 0.26-0.44 for pay, 0.38-0.41 for opportunities for promotion, 0.15-0.46 for supervision, and 0.27-0.45 for co-workers.

Various sub-scales of the Job Descriptive Index have been correlated with the Index of Organizational Reactions by Smith (1962) (Dunham, Smith & Blackburn, 1977), supervisor ratings (Kesselman, Wood & Hagen, 1974), the Job Involvement Scale by Lodahl and Kejner (1965) (Saal, 1978), organizational commitment by Porter and Smith (1970) (O'Reilly, Bretton & Roberts, 1974), role conflict and role ambiguity (e.g. Brief & Aldag, 1975), job characteristics (Hackman & Lawler, 1971, and leader behaviors (Keller & Syilagyi, 1976).

The Job Descriptive Index has been used by other investigators well over 100 times. Moreover, the measure has provided the impetus for the development of other scales of specific job satisfactions. For example, Slavett, Stamps, Piedmont and Haase (1978) developed a job satisfaction scale comprised of 6 components similar to the sub-scales of the Job Descriptive Index to measure nurse satisfaction. Similarly, Lichtenstein (1984) has developed a scale based on the Job Descriptive Index to measure 7 facets of physician job satisfaction.

Job Satisfaction - Quinn and Staines (1979) Quinn and Shepard (1974)

In an effort to characterize the quality of employment nationally, Quinn and his colleagues (Quinn & Shepard, 1974; Quinn & Staines, 1979) developed 3 measures of job satisfaction: facet-free job satisfaction, facet-specific job satisfaction, and overall job satisfaction. These 3 measures of job satisfaction were used in 3 national surveys in 1969, 1973, and 1977. Items in each measure are suitable to all types of employees.

The facet-free job satisfaction measure is comprised of 5 items, scored on a 5-point basis: (a) how satisfied are you with your job, (b) what type of job would you choose, (c) would you decide again to take your job, (d) how well the job measures up to the job you wanted, and (e) would you recommend your job to a good friend. A mean overall score is calculated from the 1977 national survey of 1515 respondents, Quinn and Staines (1979) report an overall mean of 3.66 (s.d. 1.02) and an internal reliability (Cronbach alpha) of 0.77.

Thirty-three items are used to measure facet-specific job satisfaction. Each item is scored from 1 to 4. Two shorter versions of facet-specific job satisfaction have been used; one version includes 7 items and the other, 18 items. These 2 versions correlated 0.91 (7 items) and 0.97 (18 items) with the 33-item scale.

Factor analysis has been used to generate 6 components of job satisfaction: comfort, challenge, financial rewards, relations with co-workers, resource adequacy, and promotion. The sub-scales do not appear to be independent of each other. In fact, Quinn and Staines recommend calculating a total score rather than using individual sub-scale scores.

From the 1977 survey the reported means for the subscales are 2.87 (s.d. 0.57), 3.00 (s.d. 0.68), 2.89 (s.d. 0.81), 3.26 (s.d. 0.61), 3.19 (s.d. 0.51), 2.46 (s.d. 0.86) for comfort, challenge, financial rewards, co-workers, resource adequacy, and promotion. The overall scale mean is 3.02 (s.d. 0.49) with an internal reliability (Cronbach alpha) of 0.42. Internal reliabilities for the subscales are 0.69 for comfort, 0.88 for challenge, 0.66 for financial rewards, 0.61 for co-workers, 0.88 for resource adequacy, and 0.76 for promotions.

Quinn and Staines (1979) derived an overall job satisfaction measure from both facet-specific job satisfaction and facet-free job satisfaction. The raw scores from each of the facet scales are transformed into z scores; a mean is

calculated from the 2 z scores for each individual and multiplied by 100.

In the 1977 survey the mean value of overall job satisfaction was -21 (s.d. 89). (In 1973 when the measure was developed the mean was zero with a standard deviation of 88.) Internal reliability of the measure was 0.85 (Cronbach alpha) and the correlation between the facet measures was 0.55. It is unclear what the added contribution to the measurement of job satisfaction this overall job satisfaction provides since total scores of job satisfaction are used with the facet-free and facet-specific measures of job satisfaction. The most widely used of the three measures appears to be facet-free job satisfaction.

Minnesota Satisfaction Questionnaire - Weiss, Dawis, England, and Lofquist (1967)

The original questionnaire consists of 100-items with 20 subscales (each subscale has 5 items) that assess general satisfaction. The sub-scales are ability utilization, achievement, activity, advancement, authority, company policies and practices, compensation, co-workers, creativity, independence, moral values, recognition, responsibility, security, social service, social status, supervision-human relations, supervision-technical, variety, and working conditions. Weiss et al.(1967) administered the scale to 1793 workers in 27 occupational groups. They reported Hoyt reliability coefficients for the possible 567 coefficients (20 scales by 27 occupations); 83% were in excess of 0.80 and only 2.5% were lower than 0.70. Test-retest reliability (1 week) for the 20 sub-scales ranged from 0.66 to 0.91 with a median of 0.83 and 0.35 to 0.61 over a 1-year period (Bledsoe & Baber, 1979).

Gillet and Schwab (1975) correlated the 20 subscales of the Minnesota Satisfaction Questionnaire (MSQ) with the Job Descriptive Index (JDI) (Smith et al., 1969) in a survey of 273 employees. Although the correlations among the 2 measures varied from 0.00 to 0.85, the correlations between the sub-scales shared in common were moderate to high. Pay (JDI) and advancement (MSQ)

correlated 0.56, promotion (JDI) and company policies and practices (MSQ) correlated 0.57, supervision (JDI) and supervision human relation (MSQ) correlated .70, and co-worker scales from both correlated 0.49. Others (e.g. Bledsoe & Baber, 1979) have factor analyzed the 100 items and found that 2 factors emerge. One factor represents extrinsic satisfaction as measured by the supervision - human relations, supervision - technical, company policies and practices, working conditions, advancement, compensation, and security sub-scales. The other factor is intrinsic satisfaction, represented by the remaining 13 sub-scales.

A short form of 20 items with a 5-point response format was developed by Weiss et al. (1967) from the longer 100-item scale. The short form was the result of selecting the one item from each sub-scale that correlated most strongly with its scale total. Weiss and his colleagues have factor analyzed this short form of the satisfaction questionnaire and report the same 2 factors, intrinsic and extrisic satisfaction. They report mean scores from 1723 employees of 74.85 (s.d. 11.92) for general satisfaction, 47.14 (s.d. 7.42) for intrinsic satisfaction, and 19.98 (s.d. 4.78) for extrinsic satisfaction. Possible range of score for intrinsic satisfaction is 12 to 60 and for extrinsic is 6 to 30.

Hoyt internal reliability coefficients were 0.86 (range 0.84 to 0.91) for intrinsic satisfaction, 0.80 (range 0.77 to 0.82) for extrinsic satisfaction, and 0.90 (range 0.87 to 0.92) for general satisfaction. Test-retest reliability is 0.89 over a 1-week period and 0.70 over a 1-year period.

The short form of the Minnesota Satisfaction Questionnaire appears to be widely used. Numerous investigators have reported that the scale is a good measure of job satisfaction (e.g. Waneous, 1974; Motowidlo & Borman, 1978).

Other Measures of Job Satisfaction

In addition to the 13 scales of job satisfaction reviewed thus far, there are at least a dozen other scales available. Some of these other scales have been used less frequently and have less psychometric information available. Others are 1-item measures of job satisfaction rather than multiple-item (e.g. Kunin, 1955). Several of the less frequently used scales will be mentioned so that the reader is aware of their existence. The Michigan Organizational Assessment Questionnaire (Cammann, Fichman, Jenkins & Klesh, 1979; Seashore, Lawler, Mirvis & Cammann, 1982) contains a 3-item measure of overall job satisfaction, a 3-item measure of intrinsic rewards satisfaction, a 3-item measure of extrinsic rewards satisfaction, a 3-item measure of social rewards satisfaction and a 3-item measure of pay satisfaction. Each item in the questionnaire is scored on a 7-point scale. Cronbach alphas for the scales are 0.77, 0.87, 0.63, 0.87, and 0.89 for overall, intrinsic rewards, extrinsic rewards, social rewards, and pay satisfaction, respectively.

Warr, Cook & Wall, (1979) developed a 15-item measure of overall job satisfaction. The purpose of this scale is to provide a short and simple but robust measure of job satisfaction. Each item is scored on a 7-point

scale. Original internal reliabilities from 2 samples were 0.85 and 0.88.

Two related scales developed by Warr are the Employment Role Scale (Parry & Warr, 1980) and the Managerial Opinion Scale (Warr & Routledge, 1969). The Employment Role Scale consists of 12 items that assess a working mother's satisfaction with her current job. Items are scored on a 3-point scale and the scale's internal reliability (Cronbach alpha) was 0.78. The Managerial Opinion Survey is a scale especially designed to assess the job satisfaction of managers and supervisors. There are 77 items in the survey that collate into 7 subscales. Spearman-Brown coefficients for each subscale are 0.81 (work itself), 0.74 (pay), 0.80 (prospects of promotion), 0.86 (immediate superior), 0.82 (managers of own levels), 0.81 (subordinates), and 0.80 (firm as a whole).

The Index of Organizational Reactions (Smith, 1962, 1976) measure 8 specific types of job satisfaction-supervision, (6 items) company identification (5 items), physical environment (6 items), financial rewards (5 items), kind of work (6 items), amount of work (4 items), co-workers (5 items), and career future (5 items). Average internal reliabilities for the 8 subscales are 0.90, 0.82, 0.90, 0.85, 0.89, 0.77, 0.77, and 0.83, respectively. This scale was quite popular in the 1960s and 1970s but have been used less frequently in the last 5 years. There appears to be no obvious reason for its waning; perhaps, the development of other scales (e.g. facet specific job satisfaction by Quinn and Staines, 1979) has precluded its use.

A scale similar to the Job Descriptive Index (Smith et al., 1969) is the Worker Opinion Survey developed by Cross (1973). This survey differs from the Job Descriptive Index in that it is designed to assess specific job satisfactions in blue collar workers, it is for international use, and has one additional subscale, firm as a whole. The other 5 specific job satisfaction subscales are similar to the 5 in the Job Descriptive Index. Internal

reliabilities (Kuder-Richardson) for men are 0.76, 0.86, 0.82, 0.80, 0.74, and 0.84 for work, pay, promotion, supervisor, co-workers, and firm; internal reliability coefficients for women are similar.

Other measures of overall job satisfaction include scales by McDonald and Gunderson (1974), O'Brien and Dowling (1980), Koch (1977), and Kornhauser (1965). Other measures of specific aspects of job satisfaction include Alderfer (1972), Alutto and Vredenburgh (1977), Dawis, Pinto, Wetzel, and Wezzer (1974), French and Chaplan (1972), Graen, Dansereau, and Minami (1972), Hall and Williams, (1973), Ivancevich (1974), Katzell, Ewen, and Korman (1974), King (1960), Kopelman (1976), Murphy and Fraser (1978), Porter (1961, 1962), Rizzo, House and Lirtzman (1970), Stamps, Piedmont, Slavitt, and Haase (1978), and Stodgill (1965). Many of these scales are briefly described by Cook et al. (1981); the reader is referred to the original publication for complete information on these scales.

Many investigators (e.g., Ferratt, 1981; Kraut & Ronen, 1975; Smilansky, 1984) have used 1-item measures of job satisfaction. Typically, the 1 item entails a question of the form "How satisfied are you with your current job?" and a 5- or 7-point Likert type resonse format indicating degree of satisfaction. These 1-item measures seem to be as useful in assessing general job satisfaction as some of shorter forms of the scales, such as Hoppock's scale of 4 items.

One unique measure of overall job satisfaction is the G.M. Faces Scales (Kunin, 1955). The original scale consists of 11 male faces with expressions ranging from a broad smile to a deep frown. Subjects select the facial expression that best represents their feelings toward their job; no verbal responses are required. A Faces Scale of female facial expressions was developed by Dunham and Herman (1975). Kunin's scale has received widespread use and continues to be used today. Often, the scale is used as a second

measure of overall job satisfaction to a primary measure such as the Job Descriptive Index (Caldwell & O'Reilly, 1982; Drasgow & Miller, 1982) or the Job Diagnostic Survey (Pines & Kafry, 1978). Correlations of the Faces scale and the Job Descriptive Index were presented earlier.

The scale is not without its methodological problems. Shifting the neutral point or anchor of scale in either a negative or positive direction affects responding; the faces do not retain their meanings (Ironson & Smith, 1981). In addition, the scales seems to be subject to positive bias with subjects preferring smiling faces (Yeager & Bardo, 1983).

Another type of job satisfaction measure worthy of mention is 1 item assessing intent to stay on the job (Kraut, 1975). Kraut has shown that this item is a valid predictor of future turnover which is consistently negatively related to overall job satisfaction (Mobley, Griffeth, Hand & Meglino, 1979). Several investigators have used the intent to stay measure along with a job satisfaction measure in order to obtain a more complete picture overall job satisfaction (e.g. Kraut & Ronen, 1975; McKenna, Oritt & Wolff, 1982).

Summary

There appears to be a plethora of job satisfaction scales. The more widely used scales have reasonable reliabilities and validities. The task for the user is to choose the scale that best meets the objectives of the particular study at hand.

General Affective States

One of the major reasons for governmental and professional concern regarding occupational stress is the observation of its negative impact on the mental health of workers. While traumatic stressors can precipitate grossly disturbed behavior with psychotic features (formerly usually diagnosed by DSM-II as Transient Situational Disturbances), by far the more common psychological response is the rise of one or more of the dysphoric affects, followed in some cases by a neurotic compensatory mechanism. We will concentrate therefore in this section on unhappy troubling feelings as outcomes of job stress, with particular attention to those measurement techniques suitable for self-administration by normal employed persons.

Several categories of positive and negative affective states have been most commonly used in occupational stress research. We will consider, in sequence, the topics of general well-being, anxiety, and depression.

Measurement of Affective States

Decades of work by psychologists and psychiatric epidemiologists have generated a number of measures of mental health. The first self-report questionnaire for the study of emotional problems is attributed to Woodworth who developed his Personal Data Sheet in 1918 as a screening test for recruits to the U.S. Army in World WarI. Since that time scores, if not hundreds, of scales have been developed for the self-report of emotional distress and disturbance. Although self-report measures have the problems of intentional and unintentional response bias, differences in interpretation of items, and errors in responding (worse among more troubled persons), they nevertheless provide the advantages of economy of professional effort, objective methods of scoring, and derivation of the data from the persons actually experiencing the phenomena under study.

A review of the psychometric characteristics of reliability, validity, and

conceptualization and measurment of happiness and subjective well-being have recently been reviewed in depth by Diener (1984). The last twenty years have seen a particular boom in studies of positive well-being. Diener lists 18 scales in this domain. These vary in length, in style, in theoretic foundation, and in psychometric properties. The reader interested in a thorough exploration of this topic is referred to the Diener review.

From this review paper and other work identified by the literature search, 5 measures appear to be the most promising. The Fordyce happiness measures are very brief but seem to enjoy a rather high reliability (Fordyce, 1977). Because this scale is not published in archival literature, it has not been widely used, but the data cited by Diener are promising.

Another unpublished scale, the General Well-Being Schedule by Dupuy (1973) also has not been published in archival literature, and thus it has not been convenient for most researchers to study its properties and evaluate its psychometric status and utility.

The third scale which seems to have major promise as a measure of well-being is the Mental Health Inventory (MHI) developed by Veit and Ware, from an item pool primarily composed of Dupuy's General Well-Being Schedule. Veit and Ware (1983) were involved in the Rand Corporation's Health Insurance Experiment, a major study of health and health care utilization involving over 5,000 respondents followed longitudinally. Veit and Ware performed a series of factor analyses, both orthogonal and oblique, and determined that their Mental Health Inventory items were structured into two major factors, psychological distress and psychological well-being. Further oblique factor analysis revealed the psychological distress factor to subdivide into three components: anxiety, depression, and loss of behavioral/emotional control. The second major factor, psychological well-being, also further subdivided into two components: general positive affect and emotional ties. These findings generally support the

predictive findings of the many commonly used measures of dysphoric affects is clearly beyond the scope of this report. We shall instead refer the reader to several recent comprehensive review papers and then make brief descriptive comments about several of the most commonly used scales that are also appropriate and economical for use with employed populations.

The recent report by Derogatis (1982) discusses the pros and cons of self-report instruments, examines the theories of stress, and then prevents a review of stimulus-oriented measures (focusing on external events), response oriented measures (focusing on reports of strain), and presents specific data on a number of the more commonly used psychological symptom inventories, such as the MMPI, the SCL-90, the Beck Depression Inventory, the State-Trait Anxiety Inventory, the depression and anxiety scales developed by Zung, affect and mood scales, and a number of interaction oriented measures.

Another monumental review was prepared by Bech (1981). This 100 page report differs from other reviews in that it concentrates on scales commonly used in Europe to measure depression, mania and other aspects of temperment. Among the U.S. scales reviewed in depth are the Hamilton Depression Scale and the Beck Depression Inventory. In addition, the new international WHO Depression Scales are discussed. Many of the scales in this detailed review are more suited for use in the psychiatric setting than among normal working populations.

Well-Being

The typical emphasis in measures of strain has been to develop scales for negative outcomes of the stress-organism interaction. There are hosts of scales for anxiety, depression, physical and psychophysiological symptoms, and other aspects of dysphoria. An important and, surprisingly, independent dimension is the amount of positive well-being an individual or group is experiencing. The

conception that mental health is not merely the absence of disturbing symptoms but also, when viewed more comprehensively, involves the presence of positive aspects of well-being. The MHI has excellent psychometric properties. Internal consistency of the 5 factor scoring system ranges from 0.83 to 0.91 and for the two major factors, 0.92 and 0.96. Test-retest coefficients at a 1-year interval range from 0.56 to 0.64.

A new measure of well-being is that developed by Cox and colleagues at the University of Nottingham (1983). This scale is composed of symptoms used in earlier symptom checklists, and was analyzed psychometrically and standardized on several large samples of industrial workers in Great Britain. Factor analyses of the items revealed that negative well-being was expressed through two independent factors: one composed of 15 items dealing with nervousness, tension, anxiety, and restlessness -- "an uptight factor"-- and the second composed of 13 items reflecting fatigue, sadness, discouragement, and exhaustion -- "a worn-out factor." The scales have strong factorial validity and internal consistency (alphas=0.88). Both scales correlate highly with Eysenck's Neuroticism scale (0.64 and 0.61), but not significantly with Extraversion. Its use in a variety of industrial settings and with defined occupational groups has provided preliminary norms which will assist in the interpretation of the meaning of new findings from additional industrial samples.

The hypothesis that well-being consists of independent positive and negative components was clearly enunciated by Bradburn who published a 10-item well-being scale in 1969. This scale has been the subject of extensive research. Our Science Citation Index search generated over 300 publications which cite the book in which Bradburn presented his scale. Bradburn's new departure was the idea that well-being is composed of two independent dimensions, the absence of negative feelings and the presence of positive

experiences. The Bradburn scale receives considerable attention in the review article by Diener(1984). It has acceptable psychometric properties, with test-retest reliabilities ranging from 0.55 to 0.70. Bradburn's original items were in dichotomous format, thus reducing the range of scale scores and precluding the estimation of frequency or intensity for the ten characteristics covered. Research by Jenkins and Stanton (unpublished) shows that expanding the response options from 2 to 3 greatly increases inter-item correlations and the internal consistency of the scale. Presumably, 4 or 5 point response options would provide even greater improvements. The Bradburn scale has been widely studied in terms of its validity. Concurrent, construct, and divergent validity have been demonstrated. The coefficients are usually modest to moderate, but this is to be expected given the dichotomous response format and the weakness of most of the validity criteria.

One of the most important recent applications of this well-being scale was its use as part of the Canada Health Survey. It was administered to 17,279 persons in a representative sample of that nation's population (using the trichotomous answer format). The article reporting this study (McDowell & Praught, 1982) also reviews the scale comprehensively, speaking to such issues as theoretic basis, criticisms of the scale, previous use and findings, item analysis and norms in the Canadian population. This data set was used for a factor analysis of the scale which confirmed the original 2 factor structure. The Bradburn scale is a valuable addition to occupational stress studies because it is brief yet still has good psychometric properties, because it includes a measure of positive health and happiness, and also because of the large bodies of normative data with which any new set of findings can be compared.

In summary, we have discovered a number of promising scales covering the dimensions of general psychological well-being. We recommend that studies of occupational stress and strain include positive measures of well-being and also

recognize that the negative symptoms commonly included in such scales can usefully be divided into separate dimensions, the actual components of which are determined by the characteristics of the item pool. The dimensions of tension and emotional drain in the Cox scale are clinically appealing. We do not recommend the development de novo of additional scales for this construct, but urge instead that priority be given to the use of these above scales in comparative predictive studies of health outcomes in working populations.

Measures of Anxiety

Spielberger and colleagues have developed a widely used self-report measure for anxiety(Spielberger et al., 1970). Spielberger conceptualizes most affects as having enduring levels which people live with day in and day out as well as short-term, self-limited emotional peaks and valleys. He refers to these temporal components as traits and states. The state-trait anxiety inventory (STAI) has 20 questions dealing with "how you generally feel" and another 20 asking "how you feel right now, at this moment."

Both the state and the trait subscales of the STAI have been widely used both in social science and medical research. The state measure is particularly suited to multiple sequential administrations to test the impact of anxiolytic drugs, stress management techniques, and medical and psychiatric interventions. The STAI currently may be the most widely used measure of anxiety in biomedical and behavioral science research. The Science Citation Index search file of biomedical literature citations revealed 134 citations of the Spielberger scale just in the period of 1981 to 1983. The Social Science Citation Index search file for 1972 to 1984 showed 1005 citations. A review of this vast literature is clearly outside the scope of the present report. In brief, this scale has been used in a variety of psychiatric, medical, pharmacologic, behavioral

science, and educational research studies. In view of the extensive normative data available from over 100 recent studies, the STAI would seem to be a valuable resource as one of the outcome measures in studies of occupational stress.

The Self-rating Anxiety Scale (SAS) was published by Zung in 1971 as a companion measure to the Self-rating Depression Scale (SDS). Less validity and reliability data are available on the SAS than on the older SDS, but Zung has reported correlations between the SAS and several other established measures such as the Taylor Manifest Anxiety Scale. The SAS would seem to be a suitable alternative in situations where the STAI or the Profile of Mood States (to be described later) are not selected for use as measures of anxiety.

Measures of Depression

Perhaps one of the first self-rating scales for depressive symptoms was the Depression Scale included as part of the Minnesota Multiphasic Psychological Inventory. This scale was derived by contrasting a sample of psychiatrically diagnosed depressed patients with a convenience sample of normals and selecting those items from the 566 in the MMPI item pool which significantly discriminated between the two groups. Sixty items were identified. Subsequent cross-validation work by Dempsey revealed that a 30-item abbreviation of the scale had both higher reliability and more clearly focused psychological properties (Dempsey, 1964). Although this scale has good psychometric properties and has been used in a number of psychometric research studies, it has not been as commonly used in occupational stress research as scales developed later.

The Beck Depression Inventory (BDI) was developed solely to diagnose depressive symptoms. Items were constructed on the basis of those overt clinical manifestations of depression utilized by psychiatists in making that diagnosis. The BDI contains 21 items to which respondents reply on a 4-point scale. The BDI has been used commonly in medical and behavioral science

research. Our Science Citation Index search generated 660 references to the original presentation of the scale by Beck and colleagues (Beck et al., 1961).

The BDI shows strong correlations (from 0.62 to 0.82) with psychiatric ratings of severity of depression. Factor analytic studies have been done which suggest the BDI contains 3 or more independent factors. The internal consistency reliability of the BDI is reported as 0.86. A 13 item short form of the BDI showed a surprisingly high internal consistency of 0.83 (as cited in Derogatis, 1982). The BDI seems particularly suited to assess milder degrees of depression and would be useful with general populations and employee groups.

The BDI has been used on many occasions to test the efficiency of pharmacologic treatment of depression. It has also been used in neuroendocrine studies and to assess levels of depression associated with psychosomatic illness, chronic pain, traumatic injuries, and the affect of stressful experiences. The BDI is a strong candidate for use in occupational studies because its properties are so well delineated and extensive normative data are available.

The Self-rating Depression Scale (SDS), published by Zung in 1965, (Zung, 1965) contains 20 items each scored on a 4-point basis. The SDS has not been as widely used as the BDI, but it has attractive psychometric features, including a balancing of items such that "yes" answers indicate depression on some items whereas "no" answers indicate depression on others. This helps to overcome aquiescence response sets. The SDS is less a "catalog of suffering" than some of the other inventories for dysphoria, making it more acceptable for respondents. It has also been used in a wide variety of subject populations. This information is reviewed by Barrett and colleagues (Barrett et al., 1978).

The depression scale with perhaps the most extensive collection of supportive data is the Center for Epidemiologic Studies Depression Scale (CES-D)

(Radloff, 1977). Although of recent development this scale has been used in national samples and in intensive community studies seeking to determine the prevalence of depressed affect in the general population. Factor analyses have been performed on this measure, and they are found to be generalizable across both sexes and broadly applicable in many segments of the general population. The best summary of work on the CES-D at the time of this writing has been done by Ross (1984).

Profile of Mood States

The Profile of Mood States by McNair and colleagues (McNair, Lorr & Droppleman, 1971) is a commonly used checklist comprised of 64 adjectives each rated as to their applicability to the subject on a 5-point scale ranging from 0 = not at all, to 4 = extremely. These items are arrayed on 6 scales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. The item composition of these scales has been confirmed by several factor analyses both in student groups and psychiatric patient groups. The internal consistency reliabilities of the POMS range from 0.84 to 0.95 using the Kuder-Richardson formula. The test- retest reliabilities of the POMS scale are reported as ranging from 0.65 to 0.74 over a median interval of 20 days.

Considerable validity data for this test is presented in the POMS Manual(1971). POMS scores show concurrent validity in distinguishing patients with various clinical levels of psychiatric disturbance, and are responsive to anxiety and tension inducing interventions. They also are sensitive to the effects of mood-altering drugs.

The POMS is a well established, convenient, reliable, and valid scale for the measurment of emotional states. Our literature search in the Social Science Citation Index search file revealed 281 references in the serial literature between 1972 and 1984. The studies cited cover a wide variety of psychosocial and health research, as well as a good number of pharmaceutical studies. The POMS has also been used as validating criterion for other scales. It is used in testing new psychiatric drugs, checking on the impact of psychotherapy, medication, pain control and other interventions. It would seem to be as useful in occupational studies as it has been in medical research, but is seldom used.

It is not necessary in our opinion to use the entire instrument. Some

studies focusing on specific moods have used a lesser number of the sub-scales. It would not be wise, however, to shorten the individual scales inasmuch as this would alter their psychometric properties to an unknown degree. Based on the homogeneous content of individual scales, such as the depression-dejection scale, it would not seem wise to use one scale in isolation, inasmuch as this would create a response set in the respondent which would permit biases to enter the results in a way which is much less likely when several POMS scales of different content are intermixed as they are in the original form.

V. Additional Considerations in Occupational Stress Research

Importance of Modifying Variables

Most occupational stress research which has been reviewed for this project adheres to a simple conceptual and analytic model: independent variables (stressors) are assessed by individual self report and then concurrently or subsequently dependent measures (strain) are obtained, also often by means of self- report. These two measures are then related in a simple bivariate design using either correlation coefficients or the t-test to decide whether group means differ significantly. The clinical and personal experience of most stress researchers, however, argues that the relationship between stressors and strains is different for persons in different social circumstances, of different ages, of different personality characteristics, or in different types of family settings. Clearly a more realistic -- and in this instance a more elaborate -- paradigm for analyzing stress data is required.

The Institute of Medicine of the National Academy of Sciences, in its book Stress and Human Health, (Elliot & Eisdorfer, 1982), recommends a three-variable approach to analyzing stress-strain relationships. The first variable deals with stimulus inputs, the second with modifying variables, and the third with outcomes. They label this the x--y--z equation. A somewhat more comprehensive model is based on the work of Selye and calls for consideration of 5 categories of variables: adaptive capacity of the organism, stimulus inputs, immediate alarm reactions, defensive adjustments, and pathological end states. Each of these 5 ingredients in the stress-strain interaction should be considered at several levels: the biological, the psychological, the interpersonal and the sociocultural. (See Jenkins, 1979 for a complete description of this model.)

One study of occupational stress, the Air Traffic Controller Health Change Study (Rose et al., 1978), has made a detailed exploration of psychosocial and

biological variables which mediate the relation between life change stress and psychiatric outcomes in this employed professional group. It was observed, for example, that the likelihood of future impulse control disorders was not related to the amount of life change stress in men who never attended church, being moderate at all levels of life change. For men who attended church reasonably regularly, however, frequency of impulse disorder was low except for those who had experienced the highest level of life change stress, in which case, rates of such disorder were high (Jenkins, 1979). In an unpublished analysis from the same study it was found that life change stress was linearly related to the future occurence of mild and moderate physical illness episodes. When this relationship was cross-tabulated by the amount of social support, as indexed by the number of times the controller was chosen by his work colleagues as an ideal team partner, it was found that the social support variable was a much stronger predictor of future illness than the life change distress measure. A two-way analysis of variance showed that the gradient from high illness rates in men selected by no other colleague to the low illness rates in those selected by many colleagues reduced the relationship between life change stress and future illness to nonsignificant levels.

These are but a few examples of the importance of modifying variables in the stress-strain relationship. The following kinds of variables are important to consider as possible modifiers:

Socio-demographic characteristics such as: age, sex, educational level, family composition, and the presence of social supports.

Certain personality characteristics such as: type A behavior, locus of control, learned helplessness, anomie, and in occupational studies, career goals. It is highly probable, for example, that friction with one's boss or failure to receive a promotion would have a much more serious emotional impact on persons who are dedicated to their career as compared to those who see their

occupation as a temporary one.

Social supports: These have been measured in a variety of ways, with or without a conceptual basis for the different approaches. There is considerable debate in the literature as to whether social supports protect people from stressful circumstances by acting as a buffer or by enhancing one's ability to cope. An empirical study designed to test these competing hypotheses has recently been published (Seers et al., 1983). An earlier review of the literature and summarization of social support theory was presented in the paper by Cobb (1976). A more recent epidemiologic-oriented review has been published by Broadhead et al.(1983).

As in other facets of occupational stress research, the measurement of social support has been made using a variety of methods, however, inadequate reliability and validity data are available for most of these scales. A detailed review of the social support literature, both theoretical and empirical has just been published by Bruhn and Philips (1984). This paper has the particular value of reviewing and summarizing 14 measures of social support which have been used in published research studies. About half of the techniques use questionnaire methods and the other half are indices composed of objective information about family composition, social activities, group memberships, and scores from other scales. The reader in search of already tested measures of psychosocial support is referred to the Bruhn and Philips article for specific references and details to aid in the selection of a measure appropriate to the population under study.

Measures of the Work Environment

Most scales used for research into occupational stress ask for individuals to report perceptions and feelings concerning themselves and their work activities. A contrasting approach is to obtain data regarding the environment in which one's work is conducted. Rudolf Moos and his colleagues have pioneered in the development of scales to assess the social and organizational environment of the workplace. Their scales, nevertheless, have a large personal element in them because they are based on self-report of individual workers. We did not find data showing the range of differences in work environment ratings by employees in the same environment. Presumably such differences reflect the extent of the "subjective element" in this self-report data. A study of the ratio of the variability of inter-individual ratings of the same environment to the variability of intra-individual ratings across different environments would speak to the question of the subjectivity vs. objectivity of this kind of environmental rating scale.

Moos and his colleagues have developed several environment scales, and we will focus on the Work Environment Scale (WES) (Moos, 1981) in this review. The purpose of the WES is to assess the social climate of a variety of jobs across many work settings. This psychometric instrument is composed of 90 true-false items arrayed in ten scales. Three scales deal with the relationships dimensions, three scales deal with the personal growth or goal orientation dimensions, and the remaining four scales deal with dimensions of system maintenance and system change.

The relationship dimension is measured by the extent to which workers are concerned about their jobs (involvement), the extent to which workers are friendly and supportive of each other (peer cohesion), and the extent to which

management supports the workers and encourages them to support each other (staff support). Several investigators (e.g., Billings & Moos, 1982) have used these three subscales as a general measure of social support in the work environment. Internal reliabilities (alphas) for these sub-scales as a unit are 0.78 and 0.88.

Personal growth or goal orientation is measured by three sub-scales: autonomy - how strongly workers are encouraged to make their own decisions; task orientation - how strongly the social setting encourages good planning and efficiency; and work pressure - how intensely the pressure of work and urgency of time permeate the work environment.

Dimensions of system maintenance and change include the explicitness of company rules and policies (clarity), the extent to which supervisors use regulations to maintain order (control), the extent to which change and new approaches are emphasized (innovation), and the pleasantness of the physical environment (physical comfort). Some researchers (e.g., Billings & Moos, 1983) have used the four subscales -- autonomy, work pressure, clarity, and supervisory control -- as an index of job stressors. The norms (mean values) for the 10 subscales are 2.80, 2.73, 2.94, 2.69, 2.51, 1.77, 2.33, 2.32, 2.40, 2.04 for involvement, peer cohesion, staff support, autonomy, task orientation, work pressure, clarity, supervisory control, innovation, and physical comfort, respectively.

Moos and his group (Moos, Clayton, & Max, 1979; Moos & Moos, 1983) have used the WES in samples of over 1400 workers in industry and over 1600 workers in the health care setting. Reported internal reliabilities for the sub-scales range from 0.69 to 0.86 and test-retest reliabilities for a one-month period range from 0.69 to 0.83. The average intercorrelation between the sub-scales is 0.20. Moos has developed two forms of the scale; one form describes the workers' ideal work setting (Form I, for Ideal), the other describes perceptions

of the current work setting (Form R for real). Psychometric information in this paper refers to Form R of the scale.

Scores on the 10 subscales of the WES can be plotted as a profile so as to identify differences in group perceptions in the circumstances of their work. A number of the ten subscales are addressed to dimensions which commonly recur in the theoretic literature of organizational psychology and occupational stress, so that WES appears to be extremely relevant for such studies. Another advantage for the WES is that it has been applied in exactly the same form in a wide variety of working populations, and therefore its properties are rather well known.

Potential for Different Approaches to Data Collection

Our review of the commonly used psychometric measures of occupational stress and strain has uncovered a very large number of commonly used techniques. A surprising feature is that almost all of these are self-report measures to be completed by the individual under study. Certainly there are a variety of different approaches to collecting data on stress and strain. These appear occasionally in the literature, but not often as part of occupationalstudies. Different sources of data may provide new perspectives and greater validity in the long run for occupational studies of stress-strain relationships. Examples are discussed below.

Sociometric techniques have proven to be very strong predictors of a variety of important characteristics. Basically, this technique asks persons in an interactive group to rate each other on a variety of attributes, or to select from among the group a limited number of persons with special characteristics: those you would like most to work with, those whose company you enjoy socially, those who come up with the new ideas, those who do not mix with the rest of the group, those who seem tense or worried, those who take leadership, or those who iron out conflicts between other group members -- the possibilities are endless. This technique has been used with great success in studies of school children, but can also be applied to the work setting. The only requirement is that the group be interactive and know each other reasonably well. For this reason this approach cannot be used when aggregates are studied or when samples are self-selected from amongst a larger group, such as referrals to an employee assistance program, or when a study sample is chosen by selecting two or three members from each of many different units. Sociometric techniques were used to great advantage in the Air Traffic Controller Health Change Study,(Rose et al. 1978), in which they proved to be strong predictors of

physical and psychological health changes, promotions, and receipt of honors. Members of adult work groups are often reluctant to pin labels on their co-workers. Thus, sociometric methods are usually more positively accepted and more validly completed if the task is to select a limited number of individuals (usually from 1 to 4) from a much larger group who have especially positive attributes. The results can be used to identify both the "cream of the crop" and social isolates -- the latter being those individuals who are not selected by any of their peers. Another approach is to have each respondent rate all other respondents in his co-worker group. This becomes a lengthy task, however, and is often not cost effective.

Another potentially valuable but seldom used approach is supervisor's ratings of employees. This report reviewed several scales by which employees rated their supervisors, but uncovered no instances of the reverse rating system. As in the case of peer ratings, supervisor's ratings must be done with the guarantee of confidentiality and this guarantee must be strictly kept. It would be instructive, for example, to determine whether self-ratings of job satisfaction or supervisor estimates of job satisfaction are the better predictor of absenteeism and job turnover.

Still another under-utilized approach to data collection is the use of group indicators. Such indicators are derived from sources other than self report of individuals, although in some instances an overall summation of self report data from group members may itself be used as an index. For example, it would be worth studying whether illness absence in employees is better predicted by their individual job satisfaction or by the overall group morale of the unit in which they are employed. Individuals could also be indexed by whether or not their work group is homogeneous as to sex, by the years of supervisory experience of their boss, by the percentage of products turned out by their group which failed to pass inspection, by the difference between an individual's

educational level and the average educational level for his/her work group, or by a great variety of work variables, as the hypotheses regarding specific stress-strain relationships might dictate.

Some years ago Webb and colleagues (1966) published a book called, Unobtrusive Measures: Nonreactive Research in the Social Sciences. The book lists several general categories of unobtrusive measures, including measures of erosion (based on the consumption of materials or the wearing out of equipment), measures of accretion (based on the products, by-products or waste materials associated with the activities under study), use of written records (including legal and business documents and production records), personal documents (in work settings this would include submissions to suggestion boxes, letters of complaints, work diaries, or other notations) use of observers, and instrumental observation (counters, recorders, physiologic monitoring). As of the 1980s very few of these innovative approaches are commonly being used in occupational stress research.

The specific approaches to be used would be dictated by the details of the work setting and the issue under study. For example, if trips to the water cooler are considered an indicator of boredom or job frustration, a number of paper cups used in each department's water cooler would give a rough index of the comparative levels of this problem across departments. In a factory,wastage of raw materials might be a suitable indicator of job skills, job commitment, or attitudes toward management. These are only hasty examples, and the creative investigator can certainly identify a variety of non-reactive indicators which might serve as either direct measures of job stress or strain or as means for supporting the construct validity of self report measures.

In summary, then, our review of the literature has indicated considerable dependence on self report psychometric measures in occupational stress research.

We urge innovation and exploration of possible additional approaches to data collection including as a preliminary list the several approaches outlined above.

VI. Recommendations for Improving Measurement of Stress and Strain

None of the scales that we have reviewed has such extensive psychometric support, and is so free from methodological difficulties, that it can be recommended without reservation. Aside from the scales' specific problems, a more general concern was cited by Kasl (1978), who questioned whether the criterion validation of self-report measures by correlating them to other self-report measures is an adequate psychometric procedure. For example, in this review, scales of role conflict often were observed to correlate negatively with measures of job satisfaction, as expected. However, if the measure of job satisfaction contains items relating to conflict on the job; existence of a significant correlation between these indices reflects an overlap of content area and perhaps an instance of construct validation or confounding rather than the establishment of a predictive relationship between an independent and a dependent variable. Clearly, existing scales and those yet to be developed require a broader set of validational sources, not only appropriate self-report measures but also ratings from coworkers, friends and family; objective performance records including absenteeism; physiological changes; stress-related outcomes such as physical and mental health problems, and so on. The true value of these techniques will not be known until their abilities to discriminate among and predict disparate but relevant variables are established.

In the development of measures for this growing field, a number of theoretical and practical issues must be faced. A recurring practice in studies of occupational stress is the use of abbreviated and unstandardized scales for measures of the variables. Often these scales are borrowed from earlier studies, but then reduced in size without analysis of the old or new data to determine the effects such abbreviations have on the psychometric properties of the scales. One striking example of the use of multiple short scales is a paper

published in 1976 in which 9 scales were used, ranging in length from 1 to 7 items. The entire questionnaire appeared to have involved only 27 items, yielding an average scale length of 3 items. Four of these scales were borrowed as fragments from prior, more complete measurement approaches.

Scales averaging 3 items in length are bound to have low reliability. Authors who use such short scales often do not cite reliability figures, but if they do it is an internal consistency estimate based on some approach such as the Spearman-Brown Prophecy Formula, which makes a projection about what the reliability of the scale would be if it were many times longer. Test-retest data are typically not available. Such short scales also can be expected generally to have low validities. The amount of common factor validity tends to be very low in relation to the individual item validity and especially to the large amount of error variance. In other terms, the signal-to-noise ratio is very low.

Another observation we made in reviewing this literature was that scales are only seldom re-used in the exact form that they were first developed. This leads to unknown degrees of non-comparability and may have much to do with our observation that rather few findings tend to be replicated across studies.

Based on this literature review we would urge the following recommendations (among others) to future researchers: 1) if the choice is to use previously published scales, they should be used in their original form and scored according to their original system, unless there are good scientific reasons to make modifications for the particular application. In this instance it is recommended that a pilot study be done to assess the comparability of the original and new forms. 2) When selecting previously published scales or developing new ones, it is preferable to measure a few variables validly than many variables poorly. This means that scales must be long enough to generate acceptable reliabilities and validities.

Another point relates, as alluded to in the review of several scales, to the meaningfulness of job stress, job satisfaction, or other work-related concepts as unidimensional constructs. While it may be more convenient to consider a single "job stress score", for example, much of the material reviewed argues for a multiple-factor orientation. This orientation suggests that a number of distinct factors may lead to the perception of stress or satisfaction in the work setting, that individuals may vary in their endorsement of each of those factors, and that some factors may be more relevant for the targeted outcomes than others. These points mirror the development of research on the Type A behavior pattern, which initially lumped a variety of behavioral style factors together into a single rating and has now evolved into examination of the components of Type A behavior, only some of which may be most directly linked to specific outcomes. It may be profitable for occupational stress research to continue in the direction of specificity and multiple causation, and on both sides of the equation; namely, consideration of the multi-dimensionality of stressors and outcomes. One example of this is that the often-neglected issue of the impact of the job on other existing roles such as within the family would benefit from greater attention with an increased emphasis on multi-dimensional outcomes.

The issue of specificity is important in a somewhat different context. The question can be raised as to whether our efforts should focus on the development of scales which are applicable across job categories or which are designed for a particular milieu. While there may be a great number of factors which are common to virtually all employment settings, clearly the job stresses of a policeman, for example, differ greatly from those of an academic behavioral scientist. The dilemma is that too general a measure of job stress may not pick up the idiosyncratic factors which make any occupation difficult, while too

specific a measure may not adequately address the more generic issues surrounding work stress and allow little grounds for comparisons across occupations. Likewise, measurement of the satisfactions involved in teaching disturbed children and in construction work has the same conceptual difficulty. Investigators have obviously gone in both directions - as seen in the measures reviewed here - but the more job-specific scales may be underrepresented because they tend to be employed in a single setting and not have extensive psychometric data available. An initial suggestion to resolve this difficulty is to attempt to address both concerns simultaneously. That is, it would be helpful to identify a set of core concerns which could be applied across situations and to develop job-specific measures which would appropriate for any sample under study. This would allow for some comparisons across groups and the accumulation of psychometric information, for identification of the unique contribution of each occcupation, and for the weighting of the relative importance of global versus specific factors for selected outcomes.

This procedure of selective modification of measures for each new population under study would also draw our attention to concerns over the applicability and clarity of our instruments for various cultural, educational and socioeconomic subgroups. Scales which have been standardized on managerial samples may be inappropriate in structure and language for a blue-collar population, even if the points addressed are commonly experienced by both groups. With women making up an increasing percentage of the workforce, and occupying roles which have been denied to them in the past, the applicability and validity of measures for this population need to be established. In addition, each occupation tends to have its own vocabulary, and use of this terminology might aid not only in improving understanding of the measure but also in respondents' acceptance of its use. This increased attention on worker diversity may lead us to discover that many of the stressors experienced by the

managers, teachers and nurses surveyed in most of the reviewed research may have given us a too-narrow perspective on job stress, and that factors other than the ones we have been considering are actually the general issues that cut across most other professions. As an illustration, an important factor is the stage of the life cycle at which one is evaluating the workers under study. Not only might young and old employees differ on many variables and thus cancel out their unique contributions to the data when they are lumped together, but also these differences may relate to some underlying factors such as career aspirations which have been barely addressed in this literature. The danger here, of course, is that increased specificity leads to decreased comparability, but we believe a balanced emphasis on general and job-particular items, with the core of the measure in as accessible a format as possible, will allow researchers to capture the richness of the employment experience and to further our understanding of the implications of job stress for all workers.

By way of summary then, our review of the psychometric measures of job stressors and job strain has led to the following broad generalizations and recommendations:

1. There has been a substantial amount of research into these issues, but there is a much greater amount of work tangential to the area, such as in organizational behavior, worker morale, and the general (non-occupational) stress-health area. There is insufficient integration of these separate but related bodies of methods and knowledge.

2. Some studies of occupational stress have failed adequately to distinguish between measures of stressors and measures of resulting strain. Studies linking job dissatisfaction with depression are an example. Others make this distinction but fail to show separately the relation of stress indicators and strain indicators to measures of physical and mental health outcomes. The

majority of studies do not consider any intervening or modifying variables. One approach to remediation of all these problems in for stress researchers to follow an acceptable model of the stress-strain-health outcome interaction in their study design, selection of variables, and analysis of data.

3. The available measures of occupational stress and strain tend to have reasonable reliability data, but little is known about their levels of validity and to what degree their reliability and validity extends to different types of workers. More work utilizing these scales across a wider range of populations with varied sources of validational support is required. In addition there are many theoretically promissing concepts for which there are few or no established psychometric measures. Focused effort is needed to develop and validate such scales.

4. The common practice of each research team to modify a published scale in a different way before using it has prevented an accumulation of normative data and consistency of inferential findings.

5. There has been an overdependence on the self-report approach both in the development of stressor and strain measures and in the criteria for validating them.

6. There has been a serious lack of prospective studies of occupational stress-strain. The preponderance of cross-sectional studies leave questions both of psychometric soundness and substantive implications unanswered.

7. Although a fair amount has been done with regard to mental health status, there has been a relative lack of occupational stress research incorporating physical health outcomes (both illnesses and injuries) in prospective designs.

8. NIOSH may wish to consider developing an initiative to support the extension and improvement of psychometric measurement of occupational stress and

strain. This may take an administrative form similar to the "networking" on a common topic supported by the Mac Arthur Foundation, or the Specialized Centers of Research (SCOR) program of the NIH (particularly NHLBI), where separate research teams address a common problem with coordination offered both by a steering committee of the principal investigators and the institute's program officers.

9. NIOSH may wish to consider cooperatively funded initiatives with "categorical" institutes. One could envision such projects as: occupational influences on cardiovascular health and risk factor reduction; impact of work changes and work stress on management of diabetes; occupational stress and substance abuse; or impact of common emotional problems (episodes of anxiety and depression) on job satisfaction, productivity, use of occupational physicians, and illness absence. The development of more adequate measurement methods must preceed substantive inter-agency research projects.

APPENDIX

The World Health Organization convened an international panel for "Consultation on Measurement of Health-Related Psychosocial Factors" in Geneva, 7-10 November 1983. This consultation was organized in response to the recommendation of a Senior Advisory Committee which recommended WHO invest more program emphases in the biobehavioral sciences as a means of advancing knowledge in general health care. The programmatic agenda for this Consultation was derived from the recommendations of the WHO Scientific Working Group on Stress, Lifestyle, and the Prevention of Illness, which convened in Sofia, Bulgaria, in November 1981. The Sofia Working Group made special note of the poor state of methodology and lack of comparability in studying social and behavioral factors in the various member countries.

One of the major concerns of the WHO is the improvement of occupational health. Appended below is a section of the Process Notes from the Geneva Consultation, which deals with occupational variables and their measurement. A copy of the complete set of process notes for the meeting may be obtained from Professor C. David Jenkins, University of Texas Medical Branch, who served as Rapporteur.

1.2.4 Occupational Variables

Dr. Raija Kalimo (Helsinki) reviewed a large array of empirical findings relating psychosocial factors at work to physical and mental health. This has been a heavily researched area particularly in the Scandinavian countries. The most widely accepted theoretical starting point regarding the relation of job to illness is that it results from an imbalance between job demands and the individual's capacities, needs, and satisfactions.

The area of occupational variables was pointed out as being very important both in developing and developed countries. In developing countries traditional

skills and labor are being replaced by mechanization. In developed countries computerization is having the same effects and puts many people out of work. In both cases the severe personal dislocation associated with occupational change and job loss appear to have serious health effects.

The difficulty in collecting reliably even data which seems relatively simple, such as occupation, was discussed. Although there is considerable complexity and a history of past difficulties, it was recommended that it would be appropriate for WHO to encourage special efforts to obtain more standardized recording at least of minimal occupational data so that studies from different nations can be compared. It was suggested that it might be more valuable to get information on work conditions than simply try to obtain job titles. Dr. Kalimo made reference to a monograph which covers 248 techniques of getting information regarding occupation. This includes systems which have been developed for trained observers to rate job conditions along a number of dimensions.

In response to the question, what are the five most important job related variables associated with health risks, the group developed the following list:

1. Job loss
2. Combination of fast tempo and lack of control of work activity
3. Shift work -- changing from night to day work frequently
4. Quantitative work overload and work underload
5. Qualitative work overload and work underload

It was also pointed out that jobs which demand prolonged vigilance and carry with them serious problems if mistakes are made (such as the work of air traffic controlling) seem to be associated with higher risks of hypertension.

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