

Occupational Stress: Its Causes and Consequences for Job Performance

Stephan J. Motowidlo
College of Business Administration
The Pennsylvania State University

John S. Packard
College of Human Development
The Pennsylvania State University

Michael R. Manning
Weatherhead School of Management
Case Western Reserve University

This paper reports two studies of occupational stress and its relation with antecedent variables and job performance. The first study, in which 104 nurses participated in group discussions and 96 nurses completed a questionnaire, identified 45 stressful events for nurses. In the second study, 171 nurses who completed another questionnaire were also rated by a supervisor and/or a co-worker. Ratings of interpersonal aspects of job performance (such as sensitivity, warmth, consideration, and tolerance) and cognitive/motivational aspects (such as concentration, composure, perseverance, and adaptability) correlated significantly with self-reported perceptions of stressful events, subjective stress, depression, and hostility. Models developed through path analysis suggest that the frequency and subjective intensity of the 45 events identified in Study 1 cause feelings of stress, which lead to depression, which, in turn, causes decrements in interpersonal and cognitive/motivational aspects of job performance.

Much of the literature on occupational stress emphasizes its effects on health. Dependent variables in such research include blood pressure, heart rate, cholesterol level, and heart disease (Cooper & Marshall, 1976). We know relatively little, however, about the relation of stress to job performance. This article examines patterns of covariation between subjective stress and job performance and explores relations with individual characteristics, job conditions, stressful work events, and affective states.

Conceptual Framework

The term *stress* is enshrouded by a thick veil of conceptual confusion and divergence of opinion. Many authors have noted the lack of consensus on even a definition of stress (e.g., Alluisi, 1982; Beehr & Newman, 1978; Cofer & Appley, 1964; Hogan & Hogan, 1982; Janis & Leventhal, 1968; McGrath, 1976; Schuler, 1980). Instead of reviewing various definitions, themes, and theoretical differences, we describe a simple model that embeds our notion of stress in a conceptual framework.

Our model follows the thinking of Lazarus, Deese, and Osler (1952) and Janis and Leventhal (1968) who viewed stress as an intervening variable with antecedent causes and behavioral

consequences. Like Janis and Leventhal, we think of stress as an unpleasant emotional experience associated with elements of fear, dread, anxiety, irritation, annoyance, anger, sadness, grief, and depression. We emphasize the negative implications of stress because we are interested primarily in its potentially dysfunctional and socially costly effects on job performance. We also focus on subjective stress and its affective implications for job performance, not on its physiological or arousal components.

Briefly, our model presumes (a) that subjective stress leads to affective states such as anxiety, hostility, and depression and to decrements in aspects of job performance, and (b) that it is caused by specific events that occur at work. The more frequent and the more intensely stressful the events are for an individual, the greater the level of subjective stress. Job conditions partly determine the frequency with which these events occur. Individual characteristics such as job experience, Type A behavior pattern, and fear of negative evaluation also determine their frequency as well as the intensity of their stressfulness for individuals. The model is shown in Figure 1 and is discussed more fully later.

Stress and Job Performance

Early studies reported deleterious effects of a wide variety of stressors on speed and accuracy in tracking, signal detection, verbal reasoning, sentence formation, and other kinds of verbal performance (Lazarus et al., 1952; Wilkinson, 1969). More recent research has been guided by propositions about the adaptive demands of stress that drain energy (Glass & Singer, 1972). In Cohen's (1980) version of this model, stressors create conditions of information overload because they force people to pay special attention. This results in cognitive fatigue and saps energy needed for task performance. Cohen (1980) reviewed sev-

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Correspondence concerning this article should be addressed to Stephan J. Motowidlo, who is now at Personnel Decisions Research Institute, 43 Main Street, SE, Suite 405, Minneapolis, Minnesota 55414.

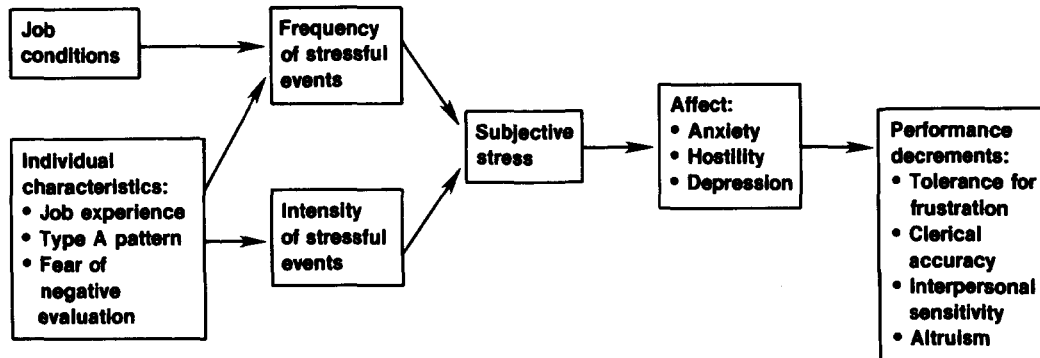


Figure 1. Preliminary model of the causes of occupational stress and its consequences for job performance.

eral studies that support this model. They show that after experiencing stressors such as noise, electric shock, bureaucratic frustration, and task load, people perform less effectively on tasks which call for tolerance for frustration, clerical accuracy, and the ability to avoid perceptual distractions. They also become less sensitive to others and show "a decrease in helping, a decrease in the recognition of individual differences, and an increase in aggression" (p. 95).

These effects on interpersonal sensitivity are consistent with results of studies on aggression (Rule & Nesdale, 1976) and altruism (Adelman, 1972; Cunningham, Steinberg, & Grev, 1980; Isen, Clark, & Schwartz, 1976; Isen & Levin, 1972; Rosenhan, Salovey, & Hargis, 1981), which indicate that negative emotions associated with stress incline people toward more aggressive and less altruistic behavior. They are also consistent with recent research in work situations where measures of job satisfaction have been used as surrogates for positive affective experience. Bateman and Organ (1983), Motowidlo (1984), and Smith, Organ, and Near (1983) reported positive correlations between job satisfaction and prosocial organizational behaviors such as helping, volunteering, cooperating, listening, and showing consideration for the needs and feelings of others.

Consequently, as shown in Figure 1, our model presumes that subjective stress generates anxiety, hostility, and depression which, in turn, affect components of job performance such as tolerance for frustration, clerical accuracy, interpersonal sensitivity, and altruism.

Stressful Events

Role conflict, ambiguity, and overload frequently have been studied as antecedents of occupational stress (e.g., Brief & Aldag, 1976; Ivancevich, Matteson, & Preston, 1982; Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964; Manning, Ismael, & Sherwood, 1981; Rosse & Rosse, 1981). Our model, however, takes a more particularized stance. It assumes that there are *specific* events which are more likely than others to cause stress and that they vary from one job to another. The model does not define these stressors a priori, but does highlight the need to identify them empirically for different jobs.

Our approach is consistent with studies in the psychosomatic literature (e.g., Holmes & Rahe, 1967) and the occupational stress literature (Gray-Toft & Anderson, 1981; Koch, Tung,

Gmelch, & Swent, 1982), which assume stress can be attributed largely to the frequency with which stressful events occur to an individual and their intensity of stressfulness for the individual. There are important differences between causes of stressful event frequency and intensity. According to our model, stressful event frequency varies according to both external work conditions and individual characteristics. Stressful events are more frequent in some job situations than others and people with certain characteristics are more likely than other people to behave in ways that increase or decrease the frequency with which such events occur.

Stressful event intensity, however, is not affected by external work conditions. People who find an event intensely stressful in some job situations are likely to find it equally stressful in other situations. Stressful event intensity is thought to reflect the operation of individual characteristics that dispose people to react more strongly to a broad range of stressors. Therefore, people who find some events intensely stressful are likely to find others intensely stressful too. This means a measure of the intensity of certain stressful events for an individual can predict subjective stress even though he or she might never actually experience those particular events.

Individual Characteristics

Despite disagreement over several conceptual and definitional issues in stress research, there seems to be consensus on the importance of individual differences. Many individual characteristics might be correlates of stress (Beehr & Newman, 1978), but we restrict attention here to job experience, Type A behavior pattern, and fear of negative evaluation.

Several studies have found negative relations between age or experience and occupational stress (Indik, Seashore, & Slesinger, 1964; Koch et al., 1982; Rosse & Rosse, 1981; Sheridan & Vredenburg, 1978). There are at least two explanations for these relations (Indik et al., 1964). One is selective withdrawal, the idea that voluntary turnover is more probable among people who experience more stress, that certain characteristics dispose some people to experience more stress, and that people are differentially likely to quit according to those characteristics. As a result, the people who remain with the organization longer are those with more stress-resistant traits. The other explanation is adaptation. It assumes that people eventually develop coping

mechanisms to deal with stress. Because this takes time, senior organizational members should be more fully adapted and, therefore, should experience less stress.

Type A behavior pattern is another potential correlate of stress. It is a behavioral syndrome that includes aggressiveness, competitiveness, impatience, and a sense of urgency in overcoming obstacles to task performance (Ivancevich & Matteson, 1984). This suggests that Type A persons act in ways which produce more stressful events for themselves and find the events more intensely stressful. In support of this possibility, Ivancevich et al., (1982) found that Type A nurses reported more work overload, more time pressures, and more role conflict.

Hogan and Hogan (1982) suggested that self-esteem is also related to stress. They argued that people have deep-seated needs for social approval. Accordingly, events that represent social rejection are stressful. Furthermore, people high in self-esteem should feel less threatened by rejection and, therefore, less vulnerable to stress from such events. This line of reasoning points to fear of negative evaluation as a trait that is especially relevant for our model. According to Leary (1983), people high in this trait try to avoid circumstances in which others will evaluate them negatively, are more distressed by negative evaluations, and are more concerned about making a good impression.

Type A behavior pattern, fear of negative evaluation, and job experience in our model are personal characteristics that cause people to behave in ways that precipitate stressful events and to experience such events as more intensely stressful when they occur. Consequently, we expect to find that Type A behavior pattern and fear of negative evaluation have positive effects on stressful event frequency and intensity, and that amount of job experience has negative effects on event frequency and intensity.

Research Purpose

The purpose of research reported here is to examine relations between working conditions, individual characteristics (work experience, Type A pattern, and fear of negative evaluation), stressful events (frequency and intensity), affect (anxiety, hostility, and depression), and job performance, according to the model in Figure 1. Because this is the first time the model has been studied empirically, we view this research as exploratory. The model specifies a causal sequence and some connections between variables, but there is not yet an empirical or theoretical basis for explicitly ruling out other connections. Our objective, therefore, is not to confirm or disconfirm the model, but to discover which of its direct effects are supported and which additional effects are suggested by the observed pattern of covariation, assuming that the causal sequence is as shown in Figure 1.

Study 1

The first study was designed to identify specific events associated with stress for hospital nurses.

Method

First, we held group discussions with 104 nurses, approximately 3 to 15 per group, from a variety of clinical areas in four hospitals. We asked

them to write brief descriptions of occasions when they felt stressed on the job. They provided a total of 608 descriptions of stressful events.

Many events were redundant or similar. Accordingly, we sorted them into homogeneous sets and wrote 82 items to describe them more generally. The items were incorporated into a questionnaire with instructions to rate them according to the question, "How often do these things generally happen to you in your job?," on a 5-point scale anchored with *never* to *fairly often*.

The questionnaire was administered to small groups of nurses at four hospitals. Usable questionnaires were obtained from 96 full-time, non-supervisory nurses, including 68 registered nurses and 28 licensed practical nurses. Their mean age is 36.0 ($SD = 11.0$) and they average 10.7 years ($SD = 8.0$) of nursing experience.

The questionnaire also included three other sets of items intended to measure aspects of stress. One was the Multiple Affect Adjective Check List (Zuckerman & Lubin, 1965), which is scored for anxiety, depression, and hostility. Because these three scales correlated with each other in the range of .66 to .81, we summed them to form a single measure of negative affect. Its internal consistency reliability (α) was .93 in this sample.

Another measure was a 10-item scale developed by Caplan, Cobb, French, Van Harrison, and Pinneau (1975) called somatic complaints. It asks how often a person suffers experiences such as spells of dizziness, trembling hands, loss of appetite, and sleeplessness ($\alpha = .75$).

The third measure was a 6-item scale prepared specially for this study. Three examples of items follow: "I feel a great deal of stress because of my job," "Very few stressful things happen to me at work," and "My job is extremely stressful." Response alternatives are on a 5-point scale of disagreement and agreement. Their sum, with appropriate reversals, was intended to measure subjective stress ($\alpha = .86$).

Correlations between these three measures ranged from .47 to .53. They were converted to standard scores and summed to form an overall composite index. Because it consists of the sum of unit-weighted standard scores, and because the correlations are about the same, each of its components (negative affect, somatic complaints, and subjective stress) has an approximately equal chance of picking up covariation with other variables through its contribution to the total score.

Results and Discussion

Frequency ratings for 45 of the 82 stressful events correlated .20 or more with the composite stress index. They involve matters such as work overload, uncooperative patients, criticism, negligent co-workers, lack of support from supervisors, and difficulties with physicians (see the Appendix for a list of the items and their correlations with the stress index). These results give us some preliminary confidence that these items describe events that cause stress for hospital nurses. We expect to find (in Study 2) that nurses who experience them more frequently and more intensely are more stressed and, as a result, perform their jobs less effectively.

Study 2

Study 2 examined relations between the stressful events identified in Study 1, work conditions, individual characteristics, subjective stress, affect, and job performance, according to the model shown in Figure 1.

Method

Procedures

A self-report questionnaire measured job conditions, amount of job experience, Type A pattern, fear of negative evaluation, the frequency

and intensity with which nurses experienced the 45 stressful events identified in Study 1, subjective stress, anxiety, hostility, and depression. It asked for the nurse's name (with promises of confidentiality), and for the names of her or his supervisor and one co-worker whom we could approach for further information about the nurse's reactions to different work situations.

All staff nurses ($N \approx 1200$) in five hospitals (hospitals different from the ones which participated in Study 1) were invited to participate in the study. Three hundred and sixty-six did volunteer to participate and returned completed self-report questionnaires. Of these, 230 identified themselves and provided names of a supervisor and/or a co-worker. Rating forms were mailed to the persons named by each nurse. As a result, ratings from one person (supervisor or co-worker) became available for 107 nurses and ratings from two persons (supervisor and co-worker) became available for 99 nurses. In all, ratings from at least one person were available for 206 of the 366 nurses who completed the self-report questionnaire.

The average age of nurses in our sample is 34.6 ($SD = 9.7$). Ninety-eight percent are women, 84% are registered nurses (the rest are licensed practical nurses), 72% work full time (the rest work part time), and 16% hold supervisory positions.

Measures

Job conditions. The self-report questionnaire asked nurses to indicate the clinical area in which they worked. Analyses reported here concentrate on 6 clinical areas with the largest numbers of nurses in our sample. They are medical/surgical, intensive/critical care, operating room, maternity/obstetrics, emergency, and pediatrics. Each area was treated as a dichotomous variable with dummy codes of 0 or 1. Thus, nurses received a score of 1 for the variable representing their own clinical area, and a score of 0 for all other areas. We used these 6 dichotomous variables to represent variation in job conditions with the expectation that the 45 stressful events identified in Study 1 would occur more frequently in some clinical areas than in others.

Individual characteristics. The self-report questionnaire measured years of nursing experience, Type A behavior pattern, and fear of negative evaluation. Type A behavior pattern was measured by the Jenkins Activity Survey (Jenkins, Rosenman, & Zyzanski, 1974). In the total sample of 366, 17 nurses omitted 1 of 21 questions on the Type A measure and 8 nurses omitted 2 questions. To preserve sample size, missing responses for these 25 nurses were replaced by each nurse's mean response to the other 19 or 20 items. The internal consistency reliability of the Type A measure (without including nurses who omitted 1 or 2 questions) was .72. Fear of negative evaluation was measured by a 12-item scale developed by Leary (1983) as a short form of the original longer scale ($\alpha = .91$).

Frequency and intensity of stressful events. Items describing the 45 stressful events identified in Study 1 were rated for frequency of occurrence and intensity of stressfulness. Frequency ratings were on a 5-point scale ranging from *never* to *fairly often* in response to the question, "How often does this generally happen to you?" Intensity ratings were on a 5-point scale from *not at all stressful* to *extremely stressful* in response to the question, "How stressful is or would this be for you?" The 45 frequency ratings were summed to form the measure of frequency of stressful events ($\alpha = .91$). Forty-five nurses omitted from 1 to 5 frequency ratings. To preserve sample size, their omitted responses were replaced by their mean response to the other 40 to 44 items. Intensity ratings were summed to form the measure of intensity of stressful events ($\alpha = .95$). Thirty-one nurses omitted from 1 to 5 intensity ratings, which were replaced by their mean intensity response to the other 40 to 44 items.

Subjective stress. Subjective stress was measured by four items: "I feel a great deal of stress because of my job," "Very few stressful things hap-

pen to me at work," "My job is extremely stressful," and "I almost never feel stressed at work." Responses were on a 5-point scale from *strongly disagree* to *strongly agree*. The sum of the four items, with appropriate reversals, made up the subjective stress score ($\alpha = .83$).

Affect. Anxiety ($\alpha = .75$), hostility ($\alpha = .70$), and depression ($\alpha = .81$) were measured with the short form of the Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1965) prefaced with the instruction to indicate "how you felt during the past three months or so at work."

Job performance. One part of the questionnaire completed by supervisors and co-workers contained 40 items that described personal sensitivity, frustration tolerance, persistence, attention to detail, and related aspects of nursing job performance. They were rated on a 5-point scale from *not at all likely* to *extremely likely* in response to the question, "If the opportunity arose, how likely is it that this nurse would . . . ?" The items were factored with squared multiple correlations in the diagonal as initial estimates of communalities and varimax rotation. They were then clustered into scales according to judgments about their content, guided by information about their factor loadings. Five scales were created in this way. Their titles and examples of items that comprise them follow: (a) *Composure*: "Become nervous or timid when working with a difficult or uncooperative patient? Lose composure when the work piles up?" (b) *Quality of patient care*: "Try to reassure a patient who was frightened or anxious? Explain nursing procedures to a patient before performing them?" (c) *Tolerance with patients*: "Become angry with an uncooperative patient? Act sad or unhappy with a patient?" (d) *Warmth toward other nurses*: "Help smooth out relationships between other nurses? Try to help and support another nurse?" (e) *Tolerance with nurses and doctors*: "Argue with a doctor about a medical or nursing procedure? Become angry with another nurse?" Their internal consistency estimates range from .70 to .92.

The second part of the rating questionnaire contained nine 9-point, graphic rating scales anchored at the high and low ends with general behavioral illustrations. The dimensions were *concentration* (handling important details with sustained and focused attention), *perseverance* (working with determination despite obstacles, setbacks, or frustration), *composure* (calm, self-assured, and organized reaction to difficult nursing situations), *morale* (energy, enthusiasm, and cheerfulness), *personal warmth* (empathy and consideration for the feelings of others), *teamwork and cooperation* (working smoothly with other nurses and doctors, supporting their emotional needs, and refraining from unnecessary conflict), *sensitivity to patients* (awareness and concern for patient's physical, social, and emotional needs), *adaptability* (adapting nursing procedures to meet the needs of individual patients), and *caring for uncooperative patients* (patiently and tactfully getting difficult patients to cooperate). The scales were factored with squared multiple correlations in the diagonal as initial estimates of communalities and varimax rotation separately for ratings from supervisors and for ratings from co-workers. The two factor structures were quite similar. In each case, two factors emerged with eigenvalues larger than 1.0, and, in each case, they accounted for 71.2% of the variance. Scales that loaded higher on one factor in one analysis also loaded higher on the same factor in the other analysis. Scales with their highest loading on the first factor included personal warmth, morale, caring for uncooperative patients, teamwork and cooperation, and sensitivity to patients. We summed them and called the total score *interpersonal effectiveness*. Scales with their highest loading on the second factor included concentration, composure, perseverance, and adaptability. We summed these ratings as well and called the total score *cognitive/motivational effectiveness*.

These procedures yielded seven performance scores. They consist of ratings provided by either a supervisor or a coworker for 99 nurses who were rated by only one person, and were computed as the average of ratings provided by a supervisor and a co-worker for 107 nurses who were rated by two persons. Correlations between the 7 performance scores ranged from .27 to .83 with a median of .54. Inter-rater corre-

Table 1
Correlations Between the Self-Report Variables

Variable	1	2	3	4	5	6	7	8
1. Years of nursing experience	—							
2. Type A pattern	.03	—						
3. Fear of negative evaluation	-.15	.07	—					
4. Frequency of stressful events	-.12	.22**	.04	—				
5. Intensity of stressful events	-.09	.10	.28**	.27**	—			
6. Subjective stress	-.11	.32**	.19*	.46**	.32**	—		
7. Anxiety	-.18*	.14	.43**	.26**	.34**	.38**	—	
8. Hostility	-.18*	.11	-.04	.14	.21**	.17*	.00	—
9. Depression	-.19*	.13	.32**	.28**	.33**	.44**	.50**	.33**

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

lations for nurses for whom two sets of ratings were available ranged from .31 ($p < .01$) to .47 ($p < .01$).

Results

Because the primary analyses in this report are multivariate, we included only nurses for whom scores on all variables were available (i.e., performance ratings from at least one rater; no more than two missing items on the Type A scale; no more than five missing items on the event frequency and intensity scales; and complete data for clinical area, years of nursing experience, fear of negative evaluation, subjective stress, and affect). There were 171 such nurses (36 in medical/surgical units, 26 in intensive/critical care, 8 in operating room units, 13 in maternity/obstetrics, 16 in emergency, 12 in pediatrics, and 60 in other areas). We compared them with the rest of the sample to detect ways in which they might differ importantly. The group for whom scores on all variables were available scored .31 standard deviation units higher on the Type A scale ($p < .05$), .40 standard deviation units higher on ratings of quality of patient care ($p < .05$), and included a larger proportion of supervisors (20%, compared with 12% in the other group, $p < .05$). There were no significant differences in years of nursing experience, fear of negative evaluation, frequency of stressful events, intensity of

stressful events, subjective stress, anxiety, hostility, depression, composure, warmth toward other nurses, tolerance with patients, tolerance with nurses and doctors, interpersonal effectiveness, cognitive/motivational effectiveness, age, tenure in their nursing unit, tenure in their hospital, or whether they worked full time or part time.

Zero-Order Correlations

Table 1 presents correlations between the self-report variables and Table 2 presents their correlations with the performance variables. As shown in Table 2, most self-report measures of variables presumed to be associated with subjective stress are significantly correlated with at least one performance variable. Of the self-report variables, depression is the one most strongly correlated with performance, followed by hostility, subjective stress, and frequency of stressful events. These correlations indicate that subjective reports of stress-related events and psychological states covary with independent judgments of work behavior. Additionally, because the stress literature has been roundly criticized (e.g., Beehr & Newman, 1978; Cooper & Payne, 1978) for relying too heavily on measures of independent and dependent variables in the same self-report question-

Table 2
Correlations Between Self-Report Variables and Performance Variables

Self-report variable	Performance variable						
	Composure	Quality of patient care	Tolerance with patients	Warmth toward other nurses	Tolerance with nurses and doctors	Interpersonal effectiveness	Cognitive/motivational effectiveness
Years of nursing experience	.10	.05	.09	-.02	-.11	.03	.04
Type A pattern	-.16*	-.12	-.11	-.16*	-.21**	-.12	-.02
Fear of negative evaluation	-.14	.00	-.05	.08	.27**	.02	-.06
Frequency of stressful events	-.22**	-.15	-.13	-.17*	-.27**	-.14	-.04
Intensity of stressful events	-.22**	-.15	-.15	-.05	-.06	-.11	-.12
Subjective stress	-.30**	-.24**	-.19*	-.18*	-.21**	-.21**	-.13
Anxiety	-.27**	-.10	-.10	.03	-.02	-.06	-.10
Hostility	-.14	-.23**	-.17*	-.22**	-.26**	-.24**	-.07
Depression	-.40**	-.29**	-.19*	-.25**	-.27**	-.31**	-.21**

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

naire, we emphasize that relations shown in Table 2 are free from this type of correlated method variance.

Path Analyses

Although interesting in their own right, zero-order correlations do not inform about the process whereby feelings of stress are aroused and how they lead to performance decrements. Consequently, we performed a series of path analyses. Because our objective was exploratory, not to confirm or disconfirm a particular model, we opted for a theory-trimming approach (Billings & Wroten, 1978; Heise, 1969; James, Mulaik, & Brett, 1982; Pedhazur, 1982).

First, each endogenous variable was regressed on all others that precede it in the model in Figure 1. Standardized beta weights were used to estimate path coefficients. This procedure assumes a general model in which all variables that precede a particular variable in the causal sequence have direct causal effects on it. Table 3 presents estimates of path coefficients computed in this manner. As shown there, many of the paths in the general model have path coefficients that do not reach statistical significance at the level of $p < .05$.

Next, the general models (each performance variable was treated as the final dependent variable in a separate model) were "trimmed" by deleting paths with insignificant path coefficients. This produced restricted models in which the statistically insignificant paths identified earlier were assumed to have path coefficients equal to zero. With that assumption, the remaining path coefficients in the restricted or trimmed models were recalculated by regressing each endogenous variable on only those antecedent variables that are now presumed to have direct paths to it. Again, standardized beta weights were used to estimate path coefficients. They appear in Figures 2, 3, and 4.

Finally, the restricted models that emerged from these analyses (i.e., the models shown in Figures 2, 3, and 4) were tested for goodness of fit using the chi-square test described by Pedhazur (1982, pp. 617–628). This test compares the variance explained by the general model, in which each endogenous variable is regressed on all preceding variables, to the variance explained by the restricted model, in which each endogenous variable is regressed on only those variables presumed to affect it directly. Information relevant to this comparison is presented in Table 4, which displays multiple correlations with each endogenous variable in the general and restricted models. The greater the difference in variance explained by the general and restricted models, the less well the restricted model fits the data. Other statistics useful for interpreting the chi-square tests of goodness of fit are shown in Table 5. The Q statistic, a measure of goodness of fit, can vary from 0 to 1. The closer it approaches 1, the better the restricted model fits the data. The Q statistic can be tested for significance by calculating W , which is distributed approximately as chi-square with d degrees of freedom, where d represents the number of paths in the restricted model that have been constrained to equal 0. None of the values for W in Table 5 is significant at $p < .05$. This means the null hypothesis that the models fit the data cannot be rejected. The models are therefore plausible explanations of the pattern of covariation observed between variables.

Table 3
Standardized Beta Weights From Multiple Regression Analyses Done to Estimate Path Coefficients in the General Models

Dependent variable	Years of nursing experience	Fear of negative evaluation	Independent variable										Anxiety	Hostility	Depression	
			Type A	Medical/surgical	Intensive critical care	Operating room	Maternity/obstetrics	Emergency	Pediatrics	Frequency of stressful events	Intensity of stressful events	Subjective stress				
Frequency of stressful events	-.13	-.03	.22**	.19*	-.01	.05	-.07	.09	-.03							
Intensity of stressful events	-.05	.28**	.09	.06	.00	-.03	-.03	-.03	-.01							
Subjective stress	-.04	.06	.20**	.07	.12	.13	-.01	.09	.06	.35**		.17*				
Anxiety	-.11	.34**	.03	-.08	-.12	-.09	.10	.12	.03	.10	.14*	.23**				
Hostility	-.16*	-.11	.08	-.03	-.03	-.02	.02	-.08	.07	.04	.19*	.09				
Depression	-.10	.22**	-.01	-.08	-.05	-.02	-.02	-.05	.01	.10	.14	.31**				
Composure	.03	.00	-.08	.04	.10	.16*	.05	-.05	.16*	-.02	-.06	-.13	-.01	-.01	-.30**	
Quality of patient care	.00	.11	-.04	.11	.01	.09	.00	-.26**	.11	.00	-.06	-.14	.13	.13	-.25**	
Tolerance with patients	.07	.00	-.04	.15	.04	.22**	-.04	-.26**	.14	-.02	-.08	-.13	.13	.10	-.13	
Warmth toward other nurses	-.05	.12	-.10	.06	-.09	.08	-.04	-.23**	.04	-.10	.01	-.05	.25*	-.10	-.33**	
Tolerance with nurses and doctors	-.12	.35**	-.14*	.10	.04	.02	-.10	-.19**	.08	-.17*	.00	-.05	.12	-.13	-.33**	
Interpersonal effectiveness	-.01	.11	-.05	.09	-.04	.06	.00	-.24**	.10	-.02	-.03	-.09	.16	-.13	-.32**	
Cognitive/motivational effectiveness	.00	.02	.02	.03	.02	.08	.09	-.08	.12	.07	-.06	-.08	.03	.00	-.20*	

^a $p < .05$. ^{**} $p < .01$.

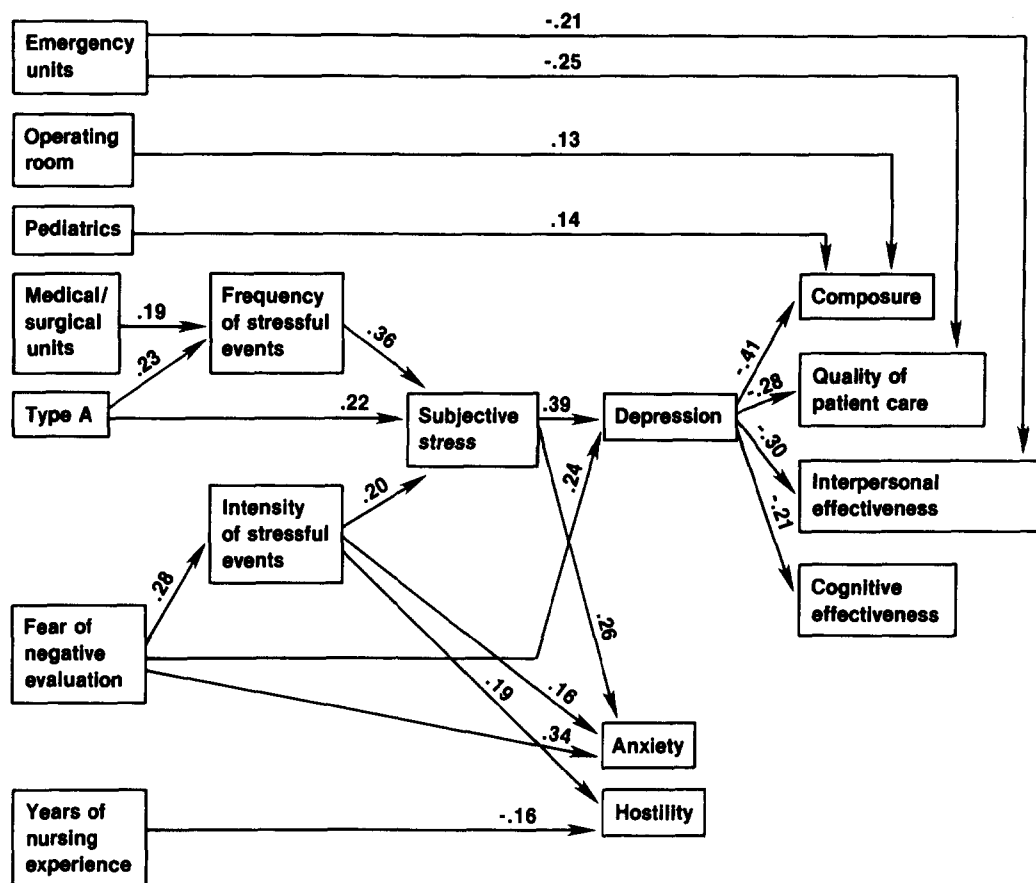


Figure 2. Path analysis of effects of stress and antecedent variables on composure, quality of patient care, interpersonal effectiveness, and cognitive effectiveness.

Discussion

Events that involve work overload, uncooperative patients, criticism, negligent co-workers, lack of support from supervisors, and difficulties with physicians (see the Appendix) are associated with feelings of stress for nurses. Perceptions of their frequency and intensity covary with subjectively experienced stress, anxiety, and depression. Interpersonal performance elements such as sensitivity, consideration, warmth, and tolerance of others, and cognitive/motivational performance elements such as concentration, composure, perseverance, and adaptability covary with perceptions of stressful events, subjective stress, depression, and hostility. If the causal arrow flies from stress to behavior, these results suggest that interventions to reduce stress might improve interpersonal and cognitive/motivational aspects of job performance.

Because we also want to know something about the process through which all this comes about, we carried out exploratory path analyses with the assumption that variables are ordered in this causal sequence: from job conditions and individual characteristics (job experience, fear of negative evaluation, and Type A behavior pattern) as exogenous variables, to perceptions of stressful events (their frequency and intensity), to subjective stress, to affect (anxiety, hostility, and depression), and, finally,

to job performance. The results support many of the important links implied by this causal order and suggest some additional, unexpected links. For several reasons, though, interpretations of these path analyses must be tempered with caution.

First, they might be subject to specification error (James, 1980; James et al., 1982). Problems of specification error are difficult to avoid in any path analysis because one can never be sure that all relevant variables have been included. The problem is especially acute in exploratory studies such as this where the theoretical or empirical basis for identifying the entire domain of relevant variables with reasonable confidence has not yet been established. If our models omit variables that have important causal effects on variables late in the chain, and that are also substantially correlated with antecedent variables, the path from the antecedent variables to the later variables could be overestimated by our analyses (James et al., 1982).

Second, although the models developed through theory trimming in this study seem consistent with the pattern of observed correlations, this does not rule out the possibility that other models might also be consistent with the data. There could be several theoretically plausible, causal configurations of the same variables that explain their observed correlations equally well. Our results show only that the models in Figures 2, 3, and 4 are among those that seem to fit the data.

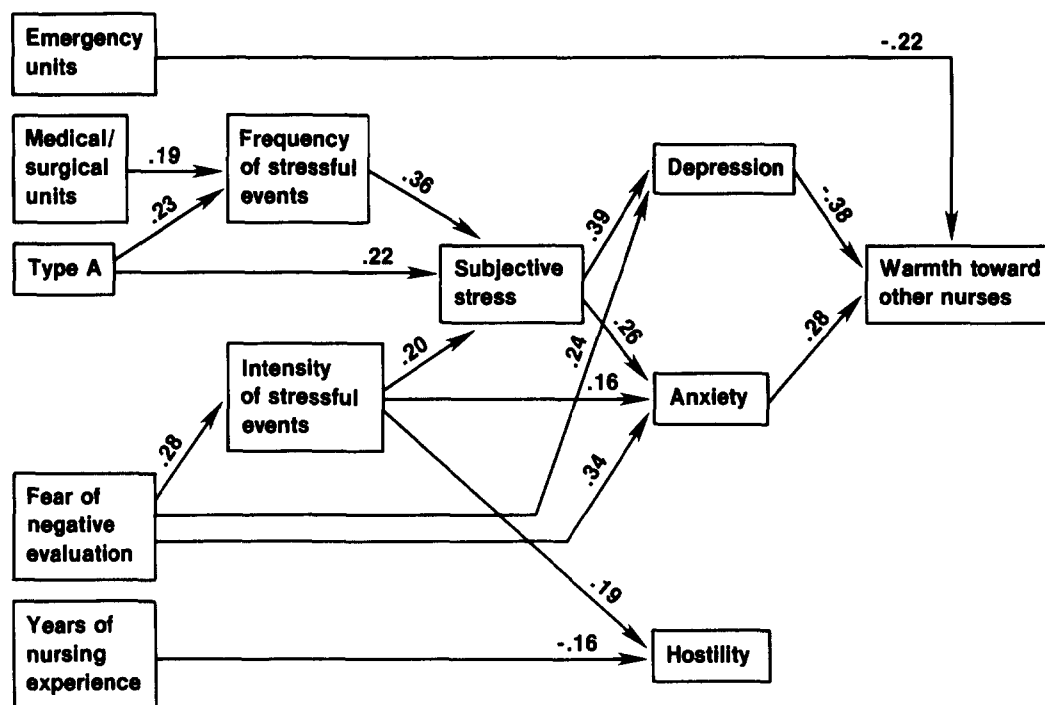


Figure 3. Path analysis of effects of stress and antecedent variables on warmth toward other nurses.

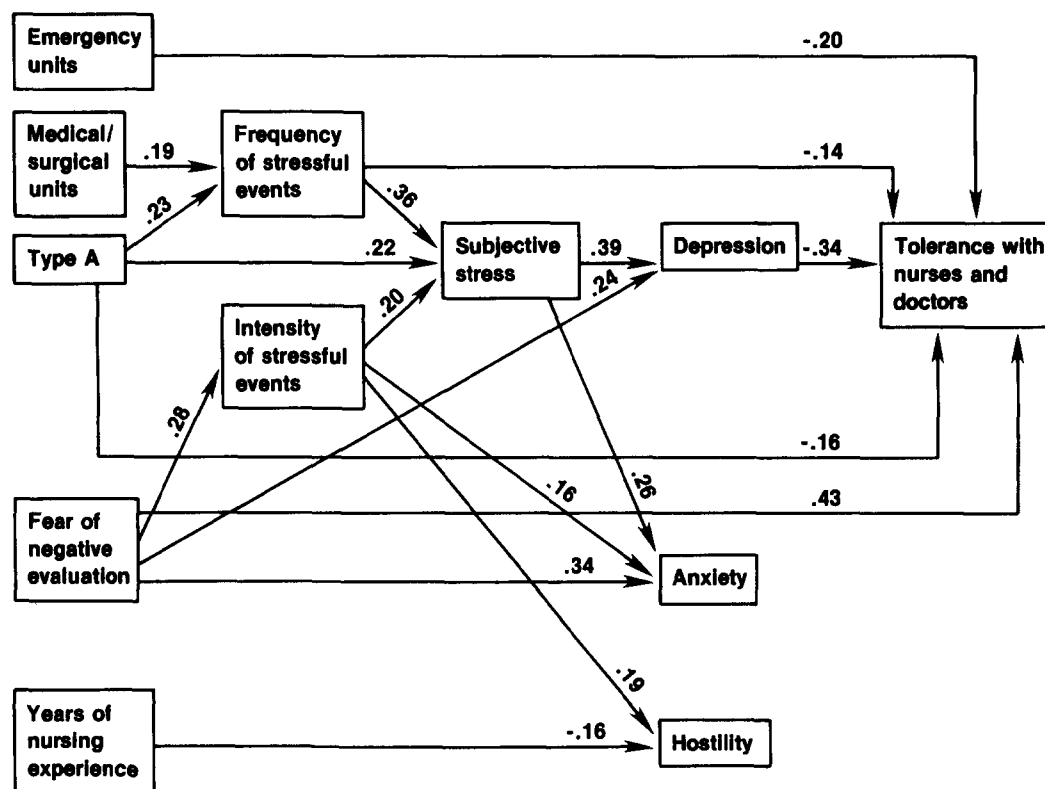


Figure 4. Path analysis of effects of stress and antecedent variables on tolerance with nurses and doctors.

Table 4
Variance Explained by General and Restricted Models

Dependent variable	General model		Restricted model	
	R^2	Number of predictors	R^2	Number of predictors
Quality of patient care	.235	15	.145	2
Composure	.245	15	.196	3
Interpersonal effectiveness	.231	15	.137	2
Cognitive/motivational effectiveness	.087	15	.046	1
Warmth toward other nurses	.226	15	.145	3
Tolerance with nurses and doctors	.374	15	.310	5
Depression	.293	12	.247	2
Anxiety	.372	12	.298	3
Hostility	.113	12	.068	2
Subjective stress	.340	11	.301	3
Frequency of stressful events	.116	9	.084	2
Intensity of stressful events	.097	9	.080	1

Third, the application of goodness-of-fit tests to models derived from theory-trimming procedures is controversial. Several authors recommend a goodness-of-fit test after theory trimming (e.g., Billings & Wroten, 1978; Pedhazur, 1982). Results of such tests must be interpreted carefully, however, because they involve using the same data to establish the plausibility of a model that were already used to develop the model. James et al. (1982) make this point quite forcefully: "The time has come for authors and reviewers to recognize that the researcher must test the goodness of fit of the model he or she begins with and not the model obtained by theory trimming (i.e., after seeing the data)" (p. 89). Consequently, the most prudent position might be to regard models developed through path analyses in this report as empirically derived hypotheses to be confirmed or disconfirmed in an independent set of data, not empirically confirmed conclusions by themselves.

There are other potential difficulties as well, such as correlated method variance among the self-report variables and the use of measures that might not be very reliable (Billings & Wroten, 1978; Heise, 1969), and they compound the need for caution in interpretation. Still, it seems safe to suggest that results of this study point to models more sharply delineated than the one with which we began and lend them sufficient credibility to serve as worthwhile targets for confirmation or disconfirmation in subsequent research.

Those models are portrayed in Figures 2, 3, and 4. Overall, they suggest that the 45 events identified in Study 1 cause nurses to feel stressed. The more frequently they occur and the more intensely stressful they are for an individual nurse, the greater the stress that she or he experiences. The events are caused jointly by conditions in the job setting and by personal characteristics that lead people to behave in ways that precipitate them. In particular, conditions in the medical/surgical units cause the events to occur more frequently to nurses who work

there. (Some of the stressful events identified in Study 1 might be more common in other clinical areas, but taken as a set, their total frequency is higher in the medical/surgical units than in all other units combined.) The events also occur more frequently to nurses with strongly Type A behavioral styles regardless of the clinical area in which they work. In addition, strongly Type A nurses simply feel more stressed regardless of how frequently or intensely they experience the 45 stressful events. How intensely stressful the events are for a particular nurse depends in part on how much she or he characteristically fears evaluation; nurses with strong fears of evaluation find the events more stressful. They also feel more anxious and depressed regardless of their reactions to the events or the amount of stress they experience as a result. Finally, feelings of job-related stress lead to feelings of depression that cause nurses to perform less effectively in the interpersonal and cognitive/motivational aspects of their job.

For reasons we cannot explain, working in emergency units is associated with lower performance in quality of patient care, interpersonal effectiveness, warmth toward other nurses, and tolerance with nurses and doctors; working in the operating room or pediatrics units is associated with higher performance on composure. Perhaps nurses were selected for these units according to personal characteristics that lead to these patterns of behavior, or perhaps conditions in these clinical areas systematically facilitate or hinder effectiveness in certain aspects of performance. At any rate, these effects seem to have nothing to do with stress because none of these clinical areas affects any stress-related antecedent of performance.

Of the affective variables, hostility had no significant effect on any performance variable, depression had a significant negative effect on all performance variables except tolerance with patients, and anxiety had a significant positive effect on warmth toward other nurses. These results suggest that if the negative effects of subjective stress on job performance are mediated by affect, it is depression that transmits it, not hostility or anxiety. When anxiety affects performance, its effects are very different from those of depression. Anxiety seems to cause nurses to behave more warmly toward other nurses, whereas depression seems to cause them to behave less warmly. Fear of negative evaluation, which is saturated with social anxiety, has an effect on tolerance with nurses and doctors similar to that of anxiety on warmth toward other nurses. Like anxiety, fear of negative evaluation is associated with higher levels of stress (through its effect on intensity of stressful events), yet it too has a positive effect on sensitivity and consideration for co-workers. One explanation might be that nurses who feel anxious, either because of enduring dispositions toward social anxiety or because of situationally induced feelings of stress, are more concerned about making a favorable impression, and for that reason show more warmth and tolerance toward their co-workers.

The models show no patterns of causation between the frequency of stressful events and their subjective intensity for individual nurses. We had no a priori expectation either that event frequency would affect intensity or that intensity would affect frequency. Neither do the two variables share antecedents in these models; no variable with causal effects in frequency or intensity also has causal effects on the other variable. Consequently, nothing in these models can explain the observed cor-

Table 5
Chi-Square Tests of Goodness of Fit for the Restricted Models

Final dependent variable in the model	<i>Q</i>	<i>d</i>	<i>W</i>
Quality of patient care	.637	65	47.8
Composure	.670	64	42.9
Interpersonal effectiveness	.636	65	48.0
Cognitive/Motivational effectiveness	.682	66	40.2
Warmth toward other nurses	.645	64	46.9
Tolerance with nurses and doctors	.650	62	47.0

Note. None of the *W* (chi-square) values are significant at $p < .05$. Goodness-of-fit tests were performed according to the procedure described by Pedhazur (1982, pp. 617–628).

relation ($r = .27, p < .01$) between frequency and intensity. The correlation might reflect nothing more than the effects of correlated method variance, because nurses rated the frequency of each event immediately after they rated the intensity of its stressfulness. On the other hand, it might reflect the operation of a more theoretically interesting variable that had been left out of the study. For instance, perhaps there are traits other than those we considered that simultaneously (a) incline people to act in ways that precipitate events like those identified in Study 1 and (b) cause them to find such events more intensely stressful when they occur.

We should also point out that the frequency variable in these models might be better conceptualized as two variables—one to represent the objective or actual frequency with which the 45 events occur and another to represent their perceived frequency. If the models were revised in this way, they would show job conditions affecting objective frequency, which affects perceived frequency, which in turn affects subjective stress. The difficulty, of course, is measuring event frequency objectively in a way that does not depend on the perceptions of the same persons whose stress and behavior are under examination. Nevertheless, if the measurement problem could be surmounted, it would lead to some interesting explorations of variables that might differentially affect the actual and perceived frequencies with which stressful events occur.

Performance scores used in this report represent aspects of the performance domain that we believed were most likely to be affected by stress. They were not designed to represent the entire performance domain or even its most important elements. Consequently, one wonders whether aspects of performance that are affected by stress make a meaningful difference in overall job effectiveness. This will depend on the job. For some jobs, it might not be particularly relevant whether incumbents effectively perform interpersonal and cognitive/motivational behaviors like those measured in this study. For other jobs, especially jobs in which success hinges upon human contact in a hectic working environment fraught with disjointed task sequences, multiple demands, emergencies, and urgent deadlines, these performance aspects are likely to be more relevant.

Zedeck and Kafry (1977) reported a study that supports our contention that behavioral patterns that we found to be associated with stress are indeed important aspects of nursing effec-

tiveness. They had registered nurses evaluate descriptions of hypothetical nursing performance for overall effectiveness. The performance descriptions varied along nine dimensions: adaptability, clinical knowledge and performance, empathy and interpersonal relations with patients, interpersonal relations (co-workers), leadership ability, organizational ability, professional growth, teaching ability, and verbal and written communications. Many of these dimensions overlap substantially with interpersonal and cognitive/motivational aspects of performance that were related to stress in our study. In particular, Zedeck and Kafry found that empathy and interpersonal relations with patients, "the ability to understand and be considerate of patient's needs and feelings, and to provide psychological support" (p. 276), was the most heavily weighted dimension in evaluations of nursing performance. Because this dimension has a great deal in common with two of our performance variables, quality of patient care and interpersonal effectiveness, they too are arguably among the most important components of nursing effectiveness.

If the models shown in Figures 2, 3, and 4 are correct, they suggest several applied strategies for reducing stress and controlling its negative effects on job performance. One is to change job conditions to eliminate unnecessarily stressful events, or, at least, to make them less frequent. Another is to change the distribution of individual characteristics associated with stressful event frequency and intensity, either by (a) selection programs that filter out characteristics likely to lead to high levels of stressful event frequency and intensity, (b) placement programs that assign persons with the least stress-resistant characteristics to the least stressful job situations, or (c) training programs that help people modify their behavioral dispositions and reactions to stress so they can become less likely to behave in ways that cause stressful events and less likely to react strongly to such events when they occur.

A third strategy is to deal directly with depression. If depression is the most immediate determinant of performance decrements in this set of variables, as suggested by our models, it offers the most promising leverage for improving performance in stressful work situations. It might be possible to relieve feelings of depression even when practical constraints make it impossible to manipulate other variables in the causal chain. This might be accomplished by treating people with more respect, support, and kindness, encouraging them to express a sense of humor and good spirits, and generally fostering more personal warmth in supervision, administration, and organizational climate. Stressful events would still occur, but their effects on depression might then be mitigated by other events that promote happiness.

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Appendix

Stressful Events for Which Frequency Ratings Correlated .20 or More With the Composite Stress Index

Stressful event items (How often do these things generally happen to you in your job?)	Correlation with composite stress index
You fall behind in your regular duties because you have extra work that is not part of your daily routine.	.42
You are so busy you have to pass up a chance to talk to a patient and give him or her some emotional support.	.39
Another nurse calls you away from important work for a trivial matter.	.39
A patient complains to you about the food or other things not under your control.	.37
Your head nurse or supervisor disagrees with your judgment about a patient's treatment or condition.	.36
A doctor is verbally abusive toward you.	.35
You perform work that should have been done by your head nurse.	.35
Your regular head nurse is temporarily absent from the unit when you need help.	.34
A doctor becomes angry at you for something that is not your fault.	.34
Your work is interrupted by delays caused by other units or departments.	.34
You have so much to do that you have to leave some things undone.	.32
You are unable to contact a doctor in an emergency.	.31
You have to make an extra trip for special supplies because a doctor changed his or her mind about a medical procedure.	.31
A doctor wastes your time by having you perform non-nursing tasks.	.30
A doctor becomes upset with you for taking too long to do something.	.30
Your unit is short-staffed because someone called in sick.	.29
A doctor does not accept your suggestions regarding a patient's condition or treatment.	.28
Your head nurse or supervisor assigns a lighter work load to a co-worker.	.28
A doctor contradicts hospital rules or standard nursing procedures which you were following with a patient.	.28
A patient under your care refuses to accept medication or other treatment.	.28
You have to explain the behavior of a doctor to a patient or the patient's family.	.28
A patient criticizes your nursing care.	.27
You have to do extra work because another unit or department did not do their own work properly.	.27
A patient becomes verbally abusive with you.	.26
Another nurse is angry or rude with you.	.26
You disagree with the patient care ordered by a doctor.	.25
You see a doctor act rudely or inconsiderately toward a patient.	.25
You see another nurse relaxing and taking it easy while you are very busy.	.25
A patient under your care refuses to eat a meal.	.25
Another nurse's negligence makes it difficult for you to perform your own work properly.	.25
Visitors are verbally abusive or rude toward a patient under your care.	.25
Your head nurse or supervisor gives you incorrect information pertaining to patient care.	.25
Another nurse will not fill in for you so you can take a day off.	.25
Your head nurse or supervisor refuses your request for time off or a change in your schedule.	.24
A patient under your care refuses to stay in bed.	.24
A patient under your care purposely removes his or her dressings.	.23
You have so much to do that you have to work overtime.	.23
You need medical equipment or supplies that are not available in your unit.	.23
A doctor publicly criticizes your nursing care.	.23
A patient tries to harm himself or herself while under your care.	.23
You hear another nurse complaining about the work load.	.22
Another nurse criticizes your nursing care.	.22
You have to use a piece of equipment or perform a nursing procedure that is new to you.	.21
A patient's family or visitors criticize your nursing care.	.20
A patient reports you to a doctor or a nursing supervisor.	.20

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