Journal of Applied Psychology
1988, Vol. 73, No. 4, 621-629


0021-9010/88/$00.75

# Coping With Competing Demands: Interruption and the Type A Pattern

Sandra L. Kirmeyer
University of Missouri, Columbia

Interruption and Type A behavior as causes of overload in police radio dispatchers were examined in this observational study. All of the dispatchers ($N = 72$) were observed throughout one work shift, and about one half of the sample were observed for two additional shifts. For each work activity, observers recorded whether it was finished before the next activity was begun (*sequential processing*), left unfinished so that the dispatcher could attend fully to a new demand (*preemption*), or processed but ultimately left unfinished while the dispatcher simultaneously attended to one or more new demands (*simultaneity*). Analysis revealed that subjects who more often had their activities preempted or who handled demands simultaneously appraised their work as more overloading and took more coping actions. The effect of objective work volume on appraisal was indirect, mediated by interruption. Regardless of the level of interruption, Type A subjects proved to have lower thresholds for appraising demands as overloading and taking coping actions than did Type B subjects. These findings implicate interruption as a critical factor in job stress among human service professionals and also demonstrate the importance of measuring objective work demands in studies of this phenomenon.

Police dispatchers play a critical role in police effectiveness in screening complaints from citizens, deciding whether to send a patrol officer, and choosing which officer to send on calls. Numerous studies have indicated that policing is a high-stress occupation, and surveys of police officers have identified a variety of potential job stressors, including poor equipment, long hours and shift work, and role overload (Davidson & Veno, 1980; Kroes, 1976). Beyond general survey research with police officers, however, there has been little systematic study of the dispatch role per se. Moreover, researchers have not yet examined the objective demands of police dispatching or how objective demands interact with personal disposition in determining job stress. The present investigation was conducted toward these ends.

Specifically, this study examined the effects of externally imposed interruption and the Type A pattern on role overload stress. Role overload, defined as having too much to do in the time available (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964), has important implications for employee health and quality of work. Previous research in organizational settings has demonstrated a significant relation between load and heavy smoking, elevated serum cholesterol, hypertension, and increased heart rate (Caplan & Jones, 1975; Cobb & Rose, 1973; French & Caplan, 1972). Because each of these factors is associated with higher rates of coronary heart disease, correlational research implicates overload as a significant risk factor in the etiology of coronary disease (Sales, 1969). Laboratory research findings on the effects of role or information overload corroborate conclusions of correlational studies (Frankenhaeuser & Johansson, 1976; Frankenhaeuser, Nordheden, Myrsten, & Post, 1971; Sales, 1969, 1970).

Overload stress affects not only employee health but also the way in which tasks are performed and feelings employees have about themselves and their jobs. Research in organizational settings and in the laboratory supports the contention of theorists (Caplan, Cobb, French, van Harrison, & Pinneau, 1975; Kahn et al., 1964; McGrath, 1976) that overload is a stressor that also has important consequences for productivity, quality of task performance, and anxiety. In particular, employees' perceptions of being overloaded are associated with greater effort, fatigue, anxiety, and job dissatisfaction (Beehr, Walsh, & Taber, 1976; Caplan & Jones, 1975). Although a single brief exposure to overload on laboratory tasks has been found to increase productivity, at the same time it results in lowered quality of performance and feelings of time pressure, tension, anger, and personal failure (O'Connell, Cummings, & Huber, 1976; Sales, 1970).

It is interesting that given the extensive research on consequences of overload for anxiety, performance, and self-perception, causes of overload have received surprisingly limited attention. Much of previous research has focused merely on volume or quantity of work to be done. Although volume has proven important, researchers have neglected other attributes of job demands that may be equally or more important to overload stress. One such attribute is interruption. As load increases, the employee's environment becomes less controllable and predictable to the extent that job tasks are interrupted. Externally imposed interruptions are often unpredictable in their timing and duration. Researchers have consistently found that uncontrolla-

This research was supported by National Science Foundation Grant BNS-8008456 and National Institute of Mental Health Grant 1 R03 MH40912-01A1.

Special thanks go to A. Jamesson, D. Kolodny, H. Sachs, and D. Weissman who served as observers; to S. Stout who assisted in the analysis of data; and to R. Arkin, T. Dougherty, and G. Hausfater for their critical comments on an earlier draft of this article.

Correspondence concerning this article should be addressed to Sandra L. Kirmeyer, Department of Psychology, 210 McAlester Hall, University of Missouri-Columbia, Columbia, Missouri 65211.

ble and unpredictable environmental conditions are stressful (Cohen, 1980).

Although there is no direct evidence that interruptions cause role-overload stress, it is reasonable to suspect that they are predictive of overload in some jobs. For example, indirect evidence is provided in early research on the "Zeigarnik effect" (for reviews see Atkinson & Birch, 1978; Butterfield, 1964; Mandler, 1964). Zeigarnik found that subjects who were prevented from finishing laboratory tasks spontaneously resumed interrupted tasks when given the freedom to do so; subjects also showed better recall of interrupted tasks compared with those they were permitted to finish.

One purpose of the present study was to examine the hypothesis that employees exposed to higher rates of interruption appraise their work as more overloading and take more actions to cope with overload than those exposed to lower rates of interruption. A second purpose is to examine the extent to which adverse effects of interruption are exacerbated by differences between individuals in response to loss of environmental control. One individual difference factor that has been conceptualized as a style of coping elicited by highly salient and uncontrollable events is the Type A coronary-prone behavior pattern (Glass, 1977; Matthews, 1982).

The Type A pattern, characterized by hostility–aggression, impatience or time urgency, and striving for competitive achievements, is predictive of the likelihood and severity of coronary heart disease (Jenkins, 1976). The Type A's counterpart, the non-coronary-prone Type B, is more patient, easygoing, and noncompetitive. Recent investigations have provided compelling evidence that Type A individuals' high need for control prevents them from relinquishing control to a partner, even when the partner's performance is clearly superior to their own (Miller, Lack, & Asroff, 1985; Strube, Berry, & Moergen, 1985; Strube & Werner, 1985). Laboratory experiments have demonstrated that Type As, compared with Type Bs, are impatient with delay and underestimate time intervals (Burnam, Pennebaker, & Glass, 1975), perform less well on a task requiring a delayed response (Glass, Snyder, & Hollis, 1974), prefer to work alone when under stress (Dembroski & MacDougall, 1978), and react with impatience and annoyance when completion of a task is delayed by the actions of another person (Glass et al., 1974). As a whole, these studies suggest that the greater control need of Type As make them more vulnerable to overload under externally imposed interruption. Thus, it was predicted that, under high rates of interruption, Type As would be more likely than their more easygoing Type B counterparts to appraise their work as overloading and to take actions to cope with overload. Under low rates of interruption, no differences were expected in either appraisal or coping.

One final concern in this study was methodological. Although theorists often assume that job stress results from actual job demands, in fact objective demands have rarely been measured. Investigations of role overload are no exception; measures of load generally consist only of employees' self-reports (Kasl, 1978). This methodological shortcoming is part and parcel of a problem endemic to research on stress and coping, that of confounding in the measurement of objective events and subjective appraisal of these events (Dohrenwend, Dohrenwend, Dodson, & Shrout, 1984; Dohrenwend & Shrout, 1985; Lazarus, DeLongis, Folkman, & Gruen, 1985). To overcome this methodological problem, the present study relied on direct observation of police dispatchers at work and used portable electronic equipment to record precisely onset and duration of all work activities. Hence, the methodology used in this study enabled independent measurement of objective demand and subjective appraisal and provided an opportunity to address the key question raised by confounding, that of whether subjective appraisal is determined by objective events, as opposed to personal disposition, or by an interaction of the two (Dohrenwend & Shrout, 1985; Lazarus et al., 1985).

## Method

### *Subjects*

The subjects were 72 nonsupervisory police officers and civilians working as radio dispatchers at 12 police stations located in rural and urban communities throughout the eastern region of New York state. On the job, these radio dispatchers handled in-person complaints from citizens, sent and received all radio communications with police officers on the road, answered telephone calls from citizens and from other agencies, placed telephone calls to other local and state agencies, and sent computer inquiries concerning such matters as drivers' licences and vehicle registrations.

A random sample of 102 employees from the personnel rosters of stations that sent and received a high volume of police information on a statewide computer network were asked to volunteer for the study. The percentage of employees at each station who volunteered ranged from 85% to 100%. Of the 91 subjects who signed the consent agreement, 19 subjects who agreed to participate were not observed because of scheduling conflicts, transfers, promotions, illnesses, or retirement.

Average tenure of the 72 subjects with their police stations was 6 years, with a range of from 1 to 20 years. Fifty-six subjects (78%) were police officers; 16 (22%) were civilians. The sample consisted of 62 (86%) men and 10 (14%) women; subjects ranged in age from 22 to 61 years, with a median age of 35 years. All of the subjects had finished high school; 35 (49%) had also completed some college courses, and 7 (10%) had graduated from college.

Observational data were collected from the 72 radio-dispatcher subjects in a two-stage procedure. During the first stage, each dispatcher was studied on one work shift. For the second stage, 37 subjects (51% of the sample) were selected randomly to participate on two additional work shifts, making possible a repeated measures design across three observational occasions. On the third work shift, however, usable observation records were available for only 32 (44%) of the 72 subjects because of equipment failures, illnesses, and transfers.

### *Procedure*

Prior to data collection, a researcher met privately with individual dispatchers to solicit their voluntary participation. After signing the consent agreement, subjects provided information on their sex, age, education, and organizational tenure and completed the Jenkins Activity Survey-Form C (JAS; Jenkins, Zyzanski, & Rosenman, 1979) as a measure of the Type A pattern.

The first day of observation was scheduled 4 to 8 weeks later. On each day of observation, one trained researcher sat in the same room with one focal subject and recorded information continuously. The observer entered the duration and characteristics of all activities into a small, hand-held electronic digital recorder (Observational Systems, Inc., O.S. MORE/ODAP Data Collection System). In addition to collecting precise quantitative records of behavior, observers rated—twice during the work shift—how busy or how rushed the subjects were and, if appropri-

ate, indicated on a checklist the coping strategies subjects had used. At the end of each work shift studied, subjects completed brief questionnaires measuring appraisal of overload and actions taken to cope with overload.

*JAS scales.* The 52 items of the JAS were scored on four scales: the Type A scale, which is a measure of the coronary-prone behavior pattern, and three additional subscales (Speed and Impatience, Hard-Driving Competitiveness, and Job Involvement) measuring factorially independent components of the broader Type A construct (Jenkins et al., 1979). The Speed and Impatience subscale deals with time urgency as reflected in, for example, becoming easily irritated and impatient when listening to someone who is taking too long to come to the point. The Hard-Driving and Competitive subscale measures the extent to which respondents perceived themselves as being driven, competitive, conscientious, and serious. Job Involvement subscale items deal primarily with striving for promotions, social status, and higher income. All four JAS scales showed adequate internal consistency (alpha coefficients ranged from .71 to .82), in contrast to the low scale consistencies for a female sample reported by Mayes, Sime, and Ganster (1984).

*Role overload and coping.* All scale scores were averages based on the sum of scale items. Subjects' perceptions of overload were measured by four items, scored on 7-point Likert scales, on which subjects rated the extent to which they felt (a) busy or rushed, (b) that the amount of work they did interfered with how well the work was done, (c) pressure in carrying out duties, and (d) that the number of requests, complaints, or problems dealt with was more than expected. The overload scale has an internal consistency estimate (alpha) of .78.

Adjustments made by subjects in the ways they handled job responsibilities were the focus of the coping index, composed of five questions, each rated on a 5-point scale. Subjects rated how often they had (a) asked those who called in for assistance to hold while they finished dealing with other complaints, (b) delayed or left undone some of their normal job responsibilities, (c) spent less time than usual handling each request or complaint from the public, (d) shortened conversations with other employees, and (e) provided more or less individualized attention than usual to police officers who radioed in with requests for information or assistance. These actions are examples of what previous researchers (Maslach, 1976; Milgram, 1970) have proposed are strategies used by overloaded persons to reduce the duration, scope, or number of inputs. The coping index had an alpha of .72.

To provide convergent validation for subjects' reports of overload and coping actions taken, observers rated these same variables twice per work shift, once after 4 hr of work and again at the end of the work shift (for the hours worked after the first rating). The observer rated the extent to which the subject was busy or rushed on a 7-point Likert scale (from *not busy at all* (1) to *extremely busy* (7)), and how he or she coped if busy. In rating coping actions, observers used a checklist to indicate whether the subject had used any of the five coping strategies previously discussed. I computed a composite coping index, the proportion of strategies checked by the observer at the mid-shift and end-of-shift ratings combined.

## Observations

*Observational categories.* Each discrete activity of the focal subject was coded according to the mutually exclusive and exhaustive activity categories. The focus of the present analyses was work activities (for a more complete description of the coding categories, see Kirmeyer, 1984). Work encompassed prescribed tasks such as processing and documenting of police radio communications, talking about past, present, or future job responsibilities, or complying with a request from a supervisor. Nonwork activities, excluded from the present analysis, were job-irrelevant actions such as drinking coffee or reading the newspaper.

Work activities were grouped into one of three categories.[1] The first category, *sequential processing,* applied to an activity that was finished without interruption. Interruption hindered or stopped the continuity of an ongoing work activity. Sequential processing occurred when one work activity was finished before the next was begun.

The next two categories represent interrupted activities. *Preemption* occurred when a focal subject responded to an incoming demand by immediately stopping his or her work, leaving it unfinished, and attending fully to the new demand. For example, a dispatcher may stop talking with a peer when a police radio transmission begins. Alternatively, subjects who were interrupted by a new demand sometimes continued their ongoing work and simultaneously processed the new demand. The category of *simultaneity* occurred when a subject began attending to a new demand before he or she had finished a previous work activity. After a period of attending to both demands simultaneously, the interruption took priority and the original work activity was left unfinished. For example, a dispatcher may enter information into a computer file on a stolen boat while answering the telephone. Once it becomes clear that the caller is reporting a burglary, the dispatcher leaves the computer entry unfinished and attends solely to the caller.

From information on work activities, I computed one measure of objective work load as well as three measures of sequential or interrupted processing. Volume of objective load was the hourly rate of subject work activities, excluding medical or police emergencies that were rare events. For each interruption category, a rate per hour of observation was computed. A second measure, proportion of time, was also calculated; this was done for each subject by dividing total amount of time engaged in a particular activity by total time observed. Because each rate was highly correlated with its parallel proportion (all $rs > .60$), only rates were analyzed in the present study.

*Observer agreement.* Interobserver agreement was checked at 2-week intervals during regularly scheduled observations for a prescheduled 90-m session. Agreement was calculated with the statistic kappa (Hartmann, 1977), which corrects the proportion of agreements for chance or expected agreements. The mean kappa values were .85, .86, and .82 for sequential processing, preemption, and simultaneity, respectively.

*Reactivity to observation.* One important question in any observational study concerns the effects of the observer's presence on what is being measured (Haynes & Horn, 1982). Although ethical and practical difficulties precluded the use of covert observation as an experimental control, it was possible to record subjects' behavioral reactions to the observer and to correlate rates of these reactions with rates of work behaviors (Kirmeyer, 1985). Subject-initiated interactions with the observer were coded as (a) verbal, research-related in content (e.g., questions or comments about research procedures, equipment, or goals), (b) verbal non-research-related (e.g., questions or comments about the weather, politics, or the observer's family), or (c) nonverbal only (e.g., subject looked at or gestured toward the observer but did not speak). Neither objective load nor the extent of sequential processing was related to subject responsiveness. Of the types of interruption, only preemption was inversely related to reactions to the observer. For subjects who were more responsive, preemption occurred less often, which suggests that the present study may have underestimated the rate at which

[1] A fourth category, *simultaneous-complete processing* ($M = 7.2$; $SD = 5.1$), occurred when the subject continued the prior work activity until finished, while responding to the new demand. This category was excluded from the present analysis because it substantially correlated with incomplete simultaneity ($r = .78$). Thus, to prevent collinearity between predictors, one of the two categories of simultaneity had to be excluded. The choice of simultaneous-complete processing was conceptually advantageous, as it meant that the remaining two categories of interruption both represented unfinished activity and differed only in whether the interrupted activity overlapped with the new demand.

Table 1
*Means, Standard Deviations, and Intercorrelations of Measures*

| Measure | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Background | | | | | | | | | | | | | |
| 1. Tenure | 6.7 | 5.1 | — | | | | | | | | | | |
| Type A behavior pattern | | | | | | | | | | | | | |
| 2. Type A[a] | −2.8 | 8.7 | −35** | — | | | | | | | | | |
| 3. Impatience | −2.2 | 8.8 | 17 | 53*** | — | | | | | | | | |
| 4. Job involvement | −4.9 | 8.2 | −30** | 23 | 07 | — | | | | | | | |
| 5. Hard-driving | −3.3 | 8.9 | 00 | 48*** | −04 | 33** | | | | | | | |
| Interruption and objective load | | | | | | | | | | | | | |
| 6. Load | 53.2 | 13.5 | −30** | 22 | −01 | 35** | 26* | — | | | | | |
| 7. Sequential | 21.0 | 7.0 | −10 | 21 | −03 | 13 | 39*** | 47*** | — | | | | |
| 8. Simultaneity | 4.5 | 3.1 | −08 | 12 | 04 | 23 | 05 | 61*** | −21 | — | | | |
| 9. Preemption | 4.9 | 3.3 | −10 | −04 | −14 | 18 | 07 | 35** | 50*** | 13 | — | | |
| Appraisal and coping | | | | | | | | | | | | | |
| 10. Overload | 3.2 | 1.2 | −10 | 29* | 31* | 27* | 12 | 59*** | 11 | 46*** | 33** | — | |
| 11. Coping | 2.4 | .7 | −09 | 31** | 34** | 35** | 11 | 51*** | −01 | 44*** | 13 | 56*** | — |

*Note.* Decimal points of correlation coefficients have been omitted.
[a] All Jenkins Activity Survey-Form C (JAS) scale scores are reported as standard scores ($M = 0.0$; $SD = 10.0$) based on normative data reported by Jenkins, Zyzanski, and Rosenman (1979). Compared with this normative sample, the average percentile score in the present sample for the Type A scale was 42.2 ($SD = 25.4$; range 3 to 99).
*$p < .05$. **$p < .01$. ***$p < .001$.

preemption occurred. Overall, however, the impact of the observer appears to have been quite small.

## Results

### *Convergent Validation of Overload and Coping Measures*

Ratings by observers corroborated subjects' self-reports of overload and coping actions taken. Subjects who reported feeling overloaded were rated by observers as having been more busy and rushed, $r(70) = .55$, $p < .0001$. One fact that contributed to the substantial convergence of subject and observer ratings was that as the quantity of work dealt with by the subject increased, so did the amount of information recorded by the observer. Observers' ratings of subjects' coping actions were not affected by this type of covariation. Nonetheless, a modest relation between observation and self-report was found: Subjects who reported taking more actions to cope with overload were observed to have actually done so, $r(70) = .31$, $p < .01$.

### *Interruption and Objective Load: A Description*

During the course of the work shift, subjects on average engaged in 53 routine work activities per hour. The average hourly rate of work load varied considerably among subjects, from a low of 21 to a high of 86 activities. Of these routine work activities, most (57%) were handled in a sequential, uninterrupted fashion, as subjects finished one activity before the next one was begun.

Interruption could be a function of subjects' personal characteristics (i.e., some persons may be more easily interrupted than others) or of the situation (i.e., objective load). Data were consistent with a situational explanation: Interruption was positively related to volume of work yet unrelated to subjects' age, sex, employment status as a civilian or police officer, organizational tenure, or Type A behavior. Coefficients of correlation among measures of interruption, sequential processing, objective load, Type A scales, and tenure are presented in Table 1.

Objective load was the strongest correlate of interruption as well as sequential processing. As objective load increased, subjects handled more requests sequentially, finishing one task before proceeding to the next, and were more often interrupted. As evidence of situational demand, however, objective load provided ambiguous information. Load was not solely a function of external demand: Subjects who handled a heavier volume of work had been with their organizations fewer years and were more job involved, hard-driving, and competitive.

To examine further the question of whether interruption was an attribute of the situation or person, the repeated measures sample was used to determine the stability of interruption and sequential processing over observation occasions. A person effect would be indicated by significant between-occasion correlations, although such correlations would not be the most persuasive evidence inasmuch as temporal stability could be due to either consistency in work demands or the person. Nonetheless, absence of significant between-occasion correlations is compelling evidence against a personal style explanation of interruption.

A differential pattern emerged: Whereas daily rates of interruption, both preemption and simultaneity, did not correlate significantly between occasions, the rate of sequential processing did. For sequential processing, the between-occasion correlations were significant for the first to second work day, $r(35) = .51$, $p < .01$, second to third work day, $r(30) = .45$, $p < .01$, and first to third work day, $r(30) = .44$, $p < .05$. Thus, interruption was a function of situational demand, whereas sequential processing appeared to be a function of both situation and person.

### *Prediction of Appraisal of Overload and Coping*

*Correlations.* As can be seen in Table 1, appraisals of overload and coping actions taken were strongly and positively intercorrelated; furthermore, the pattern of relations with interruption, objective load, and the Type A pattern was quite similar

for both variables. Appraisals of overload and coping were both positively and significantly related to objective load, measures of interruption, and the Type A score, whereas neither appraisal nor coping was related to sequential processing. Of the employee background variables examined in this study, none was related to appraisal or coping.

*Ordered regression.* Hierarchical multiple regression was used to examine (a) the main effects of interruption and the Type A pattern on appraisal and coping, and (b) the interaction between interruption and the Type A pattern. The order of entry of predictor variables into regression equations was determined a priori, and each variable was entered regardless of its statistical significance.

Organizational tenure, interruption, objective load, and the Type A pattern were entered in that order to predict appraisal of overload. Organizational tenure, although not correlated with either appraisal or coping (see Table 1), was related to the Type A pattern and also to objective load. For this reason, tenure was entered into regression equations to improve prediction; it was expected to act as a suppressor variable and improve prediction by suppressing variance in the Type A pattern (and objective load) that was irrelevant to appraisal and coping. To test the interaction between interruption and the Type A behavior pattern, two cross-product terms, computed by multiplying a rate of interruption (simultaneity or preemption) by the Type A score, were entered last into the equation.

Results of the appraisal regression analysis are presented in Table 2. Predictors accounted for 43% of the variance in subjects' perceptions of being overloaded, $F(7, 64) = 6.53$, $p < .0001$. As predicted, interruption contributed significantly to prediction, with simultaneity and preemption jointly explaining 37% of the variance in appraisal. Although objective load was strongly correlated with appraisal, it did not contribute significantly to prediction after the effects of interruption had been taken into account. The Type A behavior pattern explained an additional 5% of the variance in appraisal beyond the effects of interruption. Subjects with more extreme Type A tendencies were more likely to feel pressured and overloaded. This relation was not qualified by an interaction between interruption and the Type A pattern, contrary to prediction.

Turning to coping actions taken, the regression analysis incorporated the same set of variables used to predict appraisal (viz., tenure, interruption, objective load, and Type A pattern) with one addition—appraised overload. Cognitive appraisal was assumed to precede coping (Lazarus & Folkman, 1984; McGrath, 1976) and because of its presumed causal priority was entered before interruption, objective load, and the Type A pattern.

Results are presented in Table 2. Predictors accounted for 48% of the variance in coping, $F(8, 63) = 6.08$, $p < .0001$. Appraisal of overload accounted for a substantial proportion of the variance in coping (34%). Interruption failed to contribute significantly to an explanation of coping actions beyond its effect on appraisal. In contrast, objective load contributed significantly to coping (accounting for an additional 6% of the variance) beyond effects of subjective appraisal and interruption. Lastly, subjects with stronger Type A tendencies reported taking more actions to reduce overload. The Type A pattern accounted for an additional 5% of the variance in coping. Again, no evidence was found of an interaction between interruption and the Type A score.

*Path analysis.* On the basis of the regression findings, it appeared that interruption had two effects: a direct effect on cognitive appraisal and an indirect effect on coping mediated through appraisal. To examine more precisely the direct and indirect effects of interruption, objective load, and the Type A pattern, a recursive path-analytic model was tested. In this model, coping, appraisal, and measures of interruption were treated as endogenous variables whose variability was to be explained; the Type A score, objective load, and tenure were assumed to be determined by causes outside of the model and hence were treated as exogenous.

Specifically, the model proposed that coping was directly or indirectly determined by appraisal, interruption, objective load, and the Type A pattern. The effect of interruption on coping was expected to be indirect, mediated by the extent to which more frequent interruption increased the likelihood of appraising work demands as overloading. The effects of objective load on coping were expected to be both indirect—mediated by the extent to which increases in volume led to increases in interruption, which, in turn, affected appraisal—and direct to the extent that increases in volume triggered coping actions independent of appraisal. The effects of the Type A pattern on coping were also hypothesized to be both indirect—mediated by the extent to which more extreme Type As appraised their work as more overloading—and direct to the extent that more extreme Type As coped more vigorously regardless of how they appraised their load.

Figure 1 presents the causal model and estimates of the magnitudes of the linkages among the variables shown. Paths hypothesized to be causal are depicted by straight lines with unidirectional arrows; values above these lines are path coefficients (standardized regression weights). Noncausal relations between exogenous variables are depicted by curved lines with arrowheads at both ends; values in parentheses are correlation coefficients.

Inspection of Figure 1 reveals that the proposed model was well supported by the data. All of the path coefficients were statistically significant. When the model's path and correlation coefficients were used to reproduce the original correlation matrix (Billings & Wroten, 1978), the estimated values closely matched actual values. A Fisher $r$-to-$z$ transformation was used to test the significance of differences between actual and estimated values; all differences were nonsignificant.

*Repeated measures analyses.* To replicate findings obtained with the aggregated, between-subjects analyses, one further set of computations used subjects who were observed on at least two occasions ($n = 37$) in a repeated measures design. Appraisal and coping were analyzed by 2 × 3 (Interruption × Type A) analyses of variance with the first measure as a within-subjects variable and the second as a between-subjects variable. The JAS score distribution was divided into equal thirds, yielding three levels of the Type A–B tendency. Each level of interruption represented one complete day of observation. The inclusion of 2 rather than 3 work days had the advantage of allowing comparison of the 2 days that differed most in rate of interruption.

Results confirmed the importance of interruption and the Type A pattern. Analyses of appraised overload yielded signifi-

Table 2
*Hierarchical Regression Results for the Prediction of Appraised Overload and Coping (N = 72)*

| Predictor | Overload | | | | | Coping | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $R^2$ | $R^2$ increment | $F$ | $p$ | $\beta^a$ | $R^2$ | $R^2$ increment | $F$ | $p$ | $\beta^a$ |
| Background | | | | | | | | | | |
| Tenure | .01 | .01 | <1 | *ns* | .09 | .00 | .00 | <1 | *ns* | .26* |
| Appraisal | | | | | | | | | | |
| Overload | —[b] | — | — | — | — | .34 | .34 | 35.55 | <.001 | .34** |
| Interruption and objective load | | | | | | | | | | |
| Simultaneity (S) | .25 | .24 | 22.08 | <.001 | .46*** | .37 | .03 | 3.24 | <.10 | .18 |
| Preemption (P) | .38 | .13 | 14.26 | <.001 | .34** | .37 | .00 | <1 | *ns* | .01 |
| Load | .38 | .00 | <1 | *ns* | .06 | .43 | .06 | 6.95 | <.03 | .42** |
| Type A behavior pattern | | | | | | | | | | |
| Type A score | .43 | .05 | 5.79 | <.03 | .41 | .48 | .05 | 6.25 | <.03 | .31 |
| Product terms | | | | | | | | | | |
| Type A × S | .43 | .00 | <1 | *ns* | −.18 | .48 | .00 | <1 | *ns* | −.06 |
| Type A × P | .43 | .00 | <1 | *ns* | −.03 | .48 | .00 | <1 | *ns* | −.05 |

*Note.* $R^2$s adjusted for the ratio of predictors to sample size were .37 and .41 for overload and coping, respectively.
[a] The beta values are standardized coefficients from the final regression equation, each predictor being corrected for all other predictors. [b] The variable overload was not used as a predictor of itself.
*$p < .05$. **$p < .01$. ***$p < .001$.

cant main effects for simultaneity, $F(1, 33) = 8.84$, $p < .006$, and the Type A pattern, $F(2, 33) = 3.66$, $p < .04$. No interaction was found between the Type A pattern and simultaneity. As predicted, subjects felt more busy and rushed when they more frequently processed work demands simultaneously, and more extreme Type As felt more overloaded at both high and low levels of simultaneity. When interruption was measured in terms of preemption, subjects' appraisals of overload did not differ significantly between high and low days. A significant effect for the Type A factor was found. Subjects who were more extreme Type As felt more overloaded, $F(2, 33) = 3.54$, $p < .04$, and this effect was not modified by a Preemption × Type A interaction.

With regard to coping with overload, subjects reported taking more coping actions when interruptions were more frequent. Although this effect held for simultaneity, $F(1, 33) = 9.09$, $p < .005$, it did not for preemption. Subjects with more extreme Type A behavior engaged in more coping actions. This effect was marginally significant for simultaneity, $F(2, 33) = 2.90$, $p < .07$, and significant for preemption, $F(2, 33) = 5.35$, $p < .01$. The tendency of Type As to cope more vigorously when interrupted was not qualified by an Interruption (either simultaneity or preemption) × Type A interaction.

## Discussion

The present findings clearly demonstrate the important effects of the objective environment on subjects' appraisal of overload and coping actions. As objective load increased, subjects experienced more interruptions that either preempted their ongoing activity or resulted in their working on activities

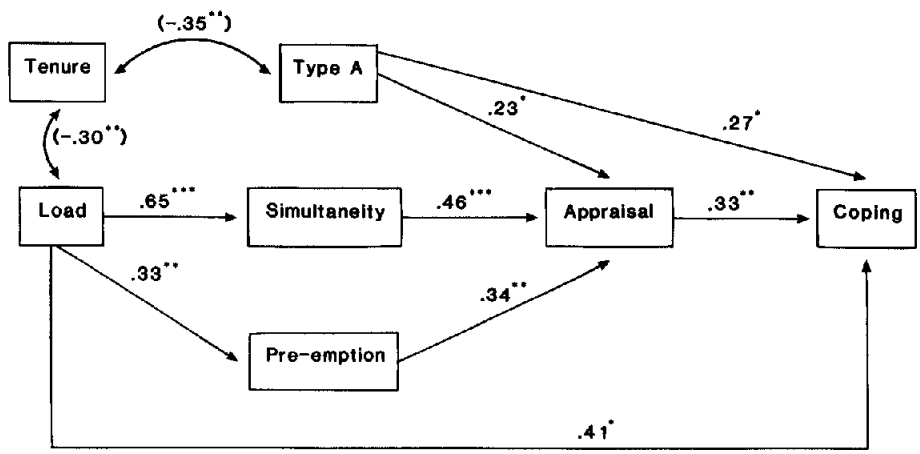


*Figure 1.* Standardized path coefficients (values shown without parentheses) and correlation coefficients (values shown in parentheses) for a causal model of the effects of load, interruption, and the Type A pattern. (*$p < .05$; **$p < .01$; ***$p < .001$.)

simultaneously. Subjects who faced more frequent interruption and were more extreme Type As more readily appraised their work as overloading and, in turn, took coping actions to reduce the duration, scope, and number of work demands.

Objective load had no direct effect on appraisal but rather an indirect effect mediated through interruption, thus confirming the value of looking beyond volume for work-based predictors of overload. Nonetheless, the effects of volume were not entirely accounted for by interruption. Objective load affected coping independently of its effects on interruption and cognitive appraisal. Appraising one's work as overloading and taking action to reduce work demands were interrelated processes, yet cognitive appraisal was not a necessary condition for action. An interesting explanation for a direct link between coping and load is suggested by research demonstrating that often-repeated and well-learned actions may be engaged in a relatively automatic or mindless fashion (Langer, Blank, & Chanowitz, 1978).

Confidence in the present findings is strengthened by the use of multiple methods of measurement, the measurement of antecedents (i.e. load, interruption, and the Type A pattern) before measurement of appraisal and coping, and use of within-subjects analyses to reconfirm findings based on between-subjects analyses. Nonetheless, the hypothesized causal linkages depicted in the path model must be interpreted with caution. Although the path model fit the data well, this analysis is not sufficient to establish causality, inasmuch as none of the variables was experimentally manipulated. Most important, it was not possible to determine the direction of causality between appraisal and coping because both variables were measured at the end of the work shift. In addition, the model was posited post hoc, on the basis of preliminary regression analyses, and therefore must be retested.

A main strength of the present study is that it demonstrates the effects of interruption on appraisal and coping, although it does not provide an explanation for these effects. One possible explanation conceptualizes interruption as an uncontrollable and unpredictable stressor that results in information overload and cognitive fatigue. Cohen (1978, 1980) proposed that uncontrollable and unpredictable stressors place increased demands on attentional capacity and, further, that cognitive fatigue is a function of an activity's attentional demand and prolonged exposure. With regard to interruption, increased attentional demand may occur because effort is required to evaluate the significance of and decide on appropriate responses to multiple, concurrent inputs. When interruption causes employees to leave tasks unfinished, these tasks act as distractors and further effort is required to inhibit attention to them while processing new inputs. Cohen's cognitive fatigue model has intriguing implications for service professionals' job performance.

One way of coping with depleted attentional reserves is to set priorities for use of attention, giving priority to information pertinent to one's own goals and neglecting less pertinent cues that carry information about the mood and needs of others (Cohen, 1980). In human service settings, however, such neglect may lower the likelihood that staff will react appropriately and empathically to clients' needs, while increasing the likelihood of oversimplified and distorted perceptions and evaluations of clients. Preliminary evidence for these effects was found in the present study: Subjects who were more often interrupted and who handled heavier objective loads coped by spending less time on each request or complaint, providing less individualized attention and delaying work on some of their (presumably lower priority) job responsibilities. In future research it would be of interest to examine the effects of interruption on quality of service and determine where depletion of attentional capacity is the cause of any reductions in quality.

In addition, it is important that future research examine the consequences of objective load and interruption for employee health and well-being. Although the present study focused exclusively on interruption and the Type A pattern as antecedents of appraisal and coping, it is theoretically and practically important to examine the effects of these variables on the long-term consequences of stress, such as psychological well-being, somatic health, and social relations. Indeed, appraisal and coping are critically important in the stress process precisely because they are hypothesized to mediate the effects of person and environment on these long-term consequences (Lazarus et al., 1985).

With regard to personal disposition, the present findings provided evidence of Type A main effects. The Type A individual's lower threshold for appraising demands as overloading and coping held at all levels of interruption. One possible explanation for the absence of an interaction between interruption and the Type A pattern is that interruption was not psychologically salient. Previous research has generally confirmed the predicted interaction when events signaling uncontrollability are highly salient to the individual. When uncontrollability is only moderately salient, Type As respond like Type Bs (Matthews, 1982). It follows that if interruption were only moderately salient in this study, then the Type A pattern should not have affected appraisal or coping. Such effects were found, however, and thus it seems reasonable to conclude that interruption was highly salient. Alternatively, it may be that even infrequent interruption is sufficiently challenging to activate the Type A pattern. If so, this would explain the Type A main effects and suggest that the predicted interaction is more likely to be found in laboratory experiments in which it is possible to create a no-interruption control group. Clearly, there is a need for more research to ascertain how Type As and Type Bs perceive and respond to interruption and, more generally, to determine more precise specification of the situations that trigger the Type A pattern (cf. Matthews, 1982).

In interpreting Type A effects on appraisal and coping, keep in mind that no evidence was found of more extreme Type As being interrupted more often. Evidence that the Type A pattern was associated with heavier objective work load was inconsistent. Although the overall Type A score was not significantly related to objective load, two components of the Type A construct, job involvement and hard-driving competitiveness, were positively correlated with objective load. Previous research relying on self-report measures has consistently found that Type As suffer from greater role overload than do Type Bs (e.g., Chesney & Rosenman, 1980; Howard, Cunningham, & Rechnitzer, 1977). However, the present research suggests that this finding, at least in part, may have resulted from perceptual effects rather than actual behavior differences. Nevertheless, the possibility that Type As actually do work harder than Type Bs cannot be

ruled out because this study provides no information on the number of hours typically worked per week, the frequency with which work was taken home in the evenings or on weekends, or on job responsibilities outside of the dispatch role. It may also be that differences in load between As and Bs emerge only in managerial roles, in which delegation (i.e., relinquishing task control) becomes critical in determining load and effectiveness. As managers, As would be expected to fail to delegate and, as a result, to find their work loads increased dramatically. Yet for nonmanagers who do not have the option of delegating, the Type A pattern may have little effect on their load.

When generalizing these findings to other human service professionals, the unique features of the dispatcher's role must be kept in mind. The very nature of dispatchers' role obligations make interruption inevitable. Dispatchers' primary obligation is to assist citizens and members of their own agencies. They give highest priority to emergencies and to do so have to differentiate quickly emergency from routine calls, thus increasing interruption. In one instance, for example, a dispatcher placed one caller reporting a stolen motorcycle on hold to determine whether the next caller was reporting an emergency. Other service professionals who see clients by appointment and do not handle emergencies may experience less fluctuation in the volume of service requests and fewer interruptions than do dispatchers.

Taken together, the present findings have several important implications. First, they confirm that subjective appraisal of overload is determined by both objective events and personal disposition. Second, findings demonstrate the feasibility of using observation to assess job environments independent of the person. The predictive power accruing from such assessment was considerable. Given the lack of common method variance in the measurement of interruption and appraisal, it was impressive to account for 37% of the variance in appraisal with only two predictors, simultaneity and preemption. Of course, direct observation is only one solution to the problem of confounding in measures of independent and dependent variables. An alternative approach, used by Shaw and Riskind (1983), involved matching composite ratings of job attributes (gathered from trained job analysts, supervisors, and job incumbents) to archival occupational indexes of stress including hypertension, suicides, and mental health admissions. Third, in addition to successfully accounting for substantial variance, the observational method used here helped to identify interruption as a cause of overload, one that had been overlooked previously. The present findings suggest an alternative route to reducing overload through increased personal control of interruption. Efforts to redesign service jobs to increase control and reduce interruption may prove helpful in alleviating job stress and improving quality of service.

## References


Atkinson, J. W., & Birch, J. (1978). *An introduction to motivation* (2nd ed.). New York: Van Nostrand.

Beehr, T. A., Walsh, J. T., & Taber, T. D. (1976). Relationship of stress to individually and organizationally valued states: Higher order needs as a moderator. *Journal of Applied Psychology, 61,* 41–47.

Billings, R. S., & Wroten, S. P. (1978). Use of path analysis in industrial/organizational psychology: Criticisms and suggestions. *Journal of Applied Psychology, 63,* 677–688.

Burnam, M. A., Pennebaker, J., & Glass, D. C. (1975). Time consciousness, achievement striving, and the Type A coronary-prone behavior pattern. *Journal of Abnormal Psychology, 84,* 76–79.

Butterfield, E. C. (1964). The interruption of tasks: Methodological, factual, and theoretical issues. *Psychological Bulletin, 62,* 309–322.

Caplan, R. D., Cobb, S., French, R. P., van Harrison, R. V., & Pinneau, S. R. (1975). *Job demands and worker health: Main effects and occupational differences* (HEW Publication No. NIOSH 75-160). Washington, DC: U.S. Government Printing Office.

Caplan, R. D., & Jones, K. W. (1975). Effects of workload, role ambiguity, and Type A personality on anxiety, depression, and heart rate. *Journal of Applied Psychology, 60,* 713–719.

Chesney, M. A., & Rosenman, M. D. (1980). Type A behavior in the work setting. In C. L. Cooper & R. Payne (Eds.), *Current concerns in occupational stress* (pp. 187–212). Chichester, England: Wiley.

Cobb, S., & Rose, R. M. (1973). Hypertension, peptic ulcer, and diabetes in air traffic controllers. *Journal of the American Medical Association, 224,* 489–492.

Cohen, S. (1978). Environmental load and the allocation of attention. In A. Baum, J. E. Singer, & S. Valins (Eds.), *Advances in environmental psychology* (Vol. 1, pp. 1–29). Hillsdale, NJ: Erlbaum.

Cohen, S. (1980). Aftereffects of stress on human performance and social behavior: A review of research and theory. *Psychological Bulletin, 88,* 82–108.

Davidson, M. J., & Veno, A. (1980). Stress and the policeman. In C. L. Cooper & J. Marshall (Eds.), *White collar and professional stress* (pp. 131–166). New York: Wiley.

Dembroski, T. M., & MacDougall, J. M. (1978). Stress effects on affiliation preferences among subjects possessing the Type A coronary-prone behavior pattern. *Journal of Personality and Social Psychology, 36,* 23–32.

Dohrenwend, B. S., Dohrenwend, B. P., Dodson, M., & Shrout, P. E. (1984). Symptoms, hassles, social supports, and life events: Problem of confounded measures. *Journal of Abnormal Psychology, 93,* 222–230.

Dohrenwend, B. P., & Shrout, P. E. (1985). "Hassles" in the conceptualization and measurement of life stress variables. *American Psychologist, 40,* 780–785.

Frankenhaeuser, M., & Johansson, G. (1976). Task demand as reflected in catecholamine excretion and heart rate. *Journal of Human Stress, 2,* 15–23.

Frankenhaeuser, M., Nordheden, B., Myrsten, A., & Post, B. (1971). Psychophysiological reactions to understimulation and overstimulation. *Acta Psychologica, 35,* 298–308.

French, R. P., & Caplan, R. D. (1972). Organizational stress and individual strain. In A. J. Marrow (Ed.), *The failure of success* (pp. 30–66). New York: Amacom.

Glass, D. C. (1977). *Behavior patterns, stress and coronary disease.* Hillsdale, NJ: Erlbaum.

Glass, D. C., Snyder, M. L., & Hollis, J. R. (1974). Time urgency and the Type A coronary prone behavior pattern. *Journal of Applied Social Psychology, 4,* 125–140.

Hartmann, D. P. (1977). Considerations in the choice of interobserver reliability estimates. *Journal of Applied Behavior Analysis, 10,* 103–116.

Haynes, S. N., & Horn, W. F. (1982). Reactivity in behavioral observation: A review. *Behavioral Assessment, 4,* 369–550.

Howard, J. H., Cunningham, D. A., & Rechnitzer, P. A. (1977). Work patterns associated with Type A behavior: A managerial population. *Human Relations, 30,* 825–836.

Jenkins, C. D. (1976). Recent evidence supporting psychological and

social risk factors for coronary disease. *New England Journal of Medicine, 295,* 987–994, 1033–1038.

Jenkins, C. D., Zyzanski, S. J., & Rosenman, M. D. (1979). *Jenkins activity survey.* New York: Psychological Corporation.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. S., & Rosenthal, R. R. (1964). *Organizational stress: Studies in role conflict and ambiguity.* New York: Wiley.

Kasl, S. V. (1978). Epidemiological contributions to the study of work stress. In C. L. Cooper & R. Payne (Eds.), *Stress at work* (pp. 3–48). New York: Wiley.

Kirmeyer, S. L. (1984). Observing the work of police dispatchers. *Applied Social Psychology Annual, 5,* 45–66.

Kirmeyer, S. L. (1985). Employee reactivity and adaptation to observation on the job. *Journal of Environmental Psychology, 5,* 355–372.

Kroes, W. H. (1976). *Society's victim—the policeman—an analysis of job stress in policing.* New York: Thomas.

Langer, E., Blank, A., & Chanowitz, B. (1978). The mindlessness of ostensibly thoughtful action: The role of "placebic" information in interpersonal interaction. *Journal of Personality and Social Psychology, 36,* 635–642.

Lazarus, R. S., DeLongis, A., Folkman, S., & Gruen, R. (1985). Stress and adaptational outcomes: The problem of confounded measures. *American Psychologist, 40,* 770–779.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping.* New York: Springer.

Mandler, G. (1964). The interruption of behavior. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (pp. 163–219). Lincoln: University of Nebraska.

Maslach, C. (1976, September). Burned-out. *Human Behavior,* pp. 16–22.

Matthews, K. A. (1982). Psychological perspectives on the Type A behavior pattern. *Psychological Bulletin, 91,* 293–323.

Mayes, B. T., Sime, W. E., & Ganster, D. C. (1984). Convergent validity of Type A behavior pattern scales and their ability to predict physiological responsiveness in a sample of female public employees. *Journal of Behavioral Medicine, 7,* 83–108.

McGrath, J. E. (1976). Stress and behavior in organizations. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1351–1394). Chicago: Rand-McNally.

Milgram, S. (1970). The experience of living in cities. *Science, 167,* 1461–1468.

Miller, S. M., Lack, E. R., & Asroff, S. (1985). Preference for control and the coronary-prone behavior pattern: "I'd rather do it myself." *Journal of Personality and Social Psychology, 49,* 492–499.

O'Connell, M. J., Cummings, L. L., & Huber, G. P. (1976). The effects of environmental information and decision unit structure on felt tension. *Journal of Applied Psychology, 61,* 493–500.

Sales, S. M. (1969). Organizational role as risk factor in coronary disease. *Administrative Science Quarterly, 14,* 325–336.

Sales, S. M. (1970). Some effects of role overload and role underload. *Organizational Behavior and Human Performance, 5,* 592–608.

Shaw, J. B., & Riskind, J. H. (1983). Predicting job stress using data from the position analysis questionnaire. *Journal of Applied Psychology, 68,* 253–261.

Strube, M. J., Berry, J. M., & Moergen, S. (1985). Relinquishment of control and the Type A behavior pattern: The role of performance evaluation. *Journal of Personality and Social Psychology, 49,* 831–842.

Strube, M. J., & Werner, C. (1985). Relinquishment of control and the Type A behavior pattern. *Journal of Personality and Social Psychology, 48,* 688–701.

Received March 20, 1986
Revision received January 11, 1988
Accepted January 18, 1988 ■

## Editor Named for APA's *Clinician's Research Digest*

The Publications and Communications Board has named George Stricker of Adelphi University's Gordon F. Derner Institute of Advanced Psychological Studies Editor of *Clinician's Research Digest (CRD),* which is being published by the American Psychological Association as of July 1988.

The six-page newsletter reports on research related to approaches to treatment modalities, including any systematic empirical study, as well as some coverage of child and gerontological issues. Although therapy is the main focus, key assessment and diagnostic questions as well as forensic issues are covered. *CRD* is an easy-to-read, fact-based, findings-oriented digest of research that summarizes for practitioners relevant material from the science base of practice. Complete citations are included so that clinicians interested in more information can request the full article from the author.

Although all published material will originate with the Editor, readers of *CRD* are invited to refer to Stricker any references or reprints of articles they find valuable.