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Interview-based measures of "type A" behavior and psychological and task-person indexes of job complexity were obtained from 251 police and fire department employees with sound cardiovascular health. Follow-up data on cardiovascular disorder were collected seven years later from participants who had remained with their organizations. The type A behavior pattern predicted cardiovascular disorder over time, and the relationships between the two complexity indexes and cardiovascular morbidity were positive among individuals with high type A behavior ratings but negative among those with low ratings. We discuss the implications of these findings for worker health and job design.

The belief that task attributes that are intrinsically meaningful to job incumbents contribute positively to their reactions to a job is almost axiomatic to most organizational behavior researchers (Fried & Ferris, 1987; Griffin, 1987). In addition, professional jobs and those requiring much training tend to be characterized by complex mental requirements, and organizations are pushing to increase the numbers of such jobs (Bernstein, Brandt, Carlson, & Padley, 1992). Recent laboratory research, however, has found that people with "type A" personalities respond with adverse cardiovascular reactions to both of these types of task complexity. If increasing job complexity is advocated on the grounds that it will improve the quality of work life or productivity, then any adverse health consequences stemming from enrichment need to be seriously considered. Likewise, type A persons seeking professional careers would need to be forewarned about the possible health consequences of holding complex jobs. In the present study, we measured type A behavior pattern status and two different types of job complexity among healthy workers and then examined those variables' relationships with cardiovascular disorder outcomes measured seven years later.

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TASK COMPLEXITY AND HYPERREACTIVITY AMONG TYPE A INDIVIDUALS

Two types of job-related complexity have been examined to date. As Campbell (1988) noted, the literature on job and task design has emphasized the psychological dimensions of tasks, often equating task complexity with the enrichment construct developed by Hackman and Oldham (1975) and measured using their Job Diagnostic Survey (JDS). Campbell labeled such task enrichment "psychological complexity." A second type of job-related complexity, task-person job complexity, refers to the extent to which a job makes mental demands that require skill and training on the part of the job incumbent. This formulation is consistent with measures of education, training, interests, and functions required of workers employed in research measuring job characteristics with the *Dictionary of Occupational Titles* (DOT; U.S. Department of Labor, 1977). Occupations can be considered high in task-person complexity when great aptitude, skill, and creativity are required of their incumbents. Such jobs can be seen as professional. Adelman (1987) measured these occupational characteristics in a study relating job complexity to worker well-being, as did Hunter, Schmidt, and Judiesch (1990) in research investigating employee selection utility.

Characteristic type A behavior includes a tendency toward impatience, hurriedness, competitiveness, and hostility. These characteristics tend to emerge when a type A individual is experiencing stress or challenge (Matthews, 1985). Stress causes a person with a strong type A behavior pattern to exhibit labile responses on cardiovascular indexes such as blood pressure and on hormonal stress indexes such as cortisol production. The individual will also recover slowly following removal of the stressor. Such arousal lability and poor recovery tend to be associated with hypertension, coronary heart disease, and coronary artery disease (Houston, 1988).

Complex jobs may represent the types of stressful situations that lead to these problems because they elicit the impatience and hurriedness that is characteristic of the type A person. In a review of laboratory research on the type A behavior pattern, Matthews stated that "a sense of time passing covaries with the complexity and amount of information coded and stored during a given interval" (1982: 311). This event will in turn "heighten the impression that time is insufficient to accomplish all of one's goals" (1982: 311).

Complex jobs may also tend to stimulate and engage their incumbents, causing susceptible individuals (that is, type A individuals) to manifest type A behavior. Drawing on ideas first stated by Obrist (1976), Contrada, Wright, and Glass noted that "a major determinant of the magnitude and duration of sympathetically-mediated responses is the degree to which individuals are engaged in effortful approach or avoidant coping. The greater the engagement, the more pronounced is the sympathetic effect" (1984: 638). Many studies have tested this hypothesis in the laboratory using manipulations that vary task complexity in different ways. In a meta-analysis, Harbin (1989) found a strong and reliable interaction between type A behavior and task stimulation, with task stimulation being more strongly related to sympathetic arousal among type A subjects than among type B subjects (those low on measures of the type A behavior pattern). Increasing psychological complexity, task-person complexity, or both enhances stimulation. Psychologically complex jobs stimulate and engage the affective and motivational systems of a worker (Hackman & Oldham, 1980), whereas jobs with high task-person complexity by definition place higher mental demands on the worker.

If jobs with high psychological or task-person complexity are more stimulating and also more likely to promote a sense of time passing rapidly than low complexity jobs, the laboratory research reviewed by Matthews (1982) and Harbin (1989) suggests that the high arousal patterns of type A people may be chronically elicited by these types of job complexity in work environments. Different job stressors have been found to interact with the type A behavior pattern in predicting various health outcomes in field research. A review by Ganster, Sime, and Mayes (1989) found that among 12 studies that tested whether stressor-health relationships were stronger among type A individuals than among type B individuals, only one study failed to find evidence of a type A behavior pattern moderator. Thus, it seems plausible that the laboratory evidence concerning one short-term stressor, task complexity, may generalize to long-term job complexity, although to date this relationship has not been tested. Our review leads to the following hypothesis:

> *Hypothesis 1: Psychological and task-person job complexity will be positively related to cardiovascular disorder among persons rated high on the type A behavior pattern but will not be so related among persons rated low on the type A behavior pattern.*

This study goes beyond previous studies by testing the moderating role of the type A behavior pattern in relationships between stress exposures and actual cardiovascular disorders, not just precursors of disorders, such as blood pressure. Further, previous studies of the moderating effects of the type A behavior pattern on relationships between job exposures and health outcomes have been cross-sectional. In the present study, we tested the hypothesis using a prospective research design. As Friedman and Booth-Kewley noted, "Well designed prospective studies of Type A are generally more informative than are comparably sized cross-sectional studies" (1988: 381). Finally, no previous research has extended the laboratory evidence that the interaction between job complexity and type A behavior enables prediction of short-term cardiovascular elevations to long-term exposures in the field and actual cardiovascular disorder.

METHODS

Participants

Survey and physiological data were collected from full-time employees of the fire and police departments of a medium-sized city (with a population of approximately 175,000 in 1982) in the midwestern United States. Job complexity and other measures were first obtained in 1982 as part of a larger study investigating work-related stress. Follow-up data on cardiovascular disorder and other factors were obtained seven years later, in 1989.

The original participants included 153 firefighters and 150 police officers, representing approximately 90 percent of the available work force. Participants were screened by self-report to determine if they had had significant heart trouble or high blood pressure prior to or during 1982. Blood pressure was also measured in 1982 by means of a remote, automated sphygmomanometer (the IBS SD-700 Digital Monitor). Only those who reported no cardiovascular complaints or a relevant history of any kind (hypertension, angina, heart trouble) and whose resting blood pressure levels did not exceed standard criteria for hypertension[1] provided the data used in the analysis. There were 251 individuals who met the above criteria and also provided complete data.

The procedures for the follow-up survey in 1989 were essentially the same, with two differences. First, the participants returned the questionnaires by mail. Second, all participants were informed that $5.00 would be contributed to the Santa Cops Charities or the Muscular Dystrophy Foundation for every completed questionnaire. Among the 251 individuals who had provided complete data in 1982, 177 (71%) responded to the follow-up questionnaire. Several of these people were excluded from the final analysis group because they were no longer employed by the same organization, and several of the remaining individuals did not provide complete medical history data.

The final analysis group (those who provided complete data on all variables) of 110 was not statistically different from the subgroup that did not provide follow-up data, as indicated by comparisons of the psychological complexity of their jobs (t = 0.78, n.s.), the task-person complexity of the jobs (t = 1.56, n.s.), and measures of the type A behavior pattern (t = 1.21, n.s.). In the final analysis group, 95 percent of the respondents were men, the mean age was 40.2 years (median = 39 years), and the average educational attainment was 14.6 years. The participants averaged 5.4 years in their present positions (s.d. = 4.1) and 9.6 years of service in their organizations (s.d. = 6.0). The final group was almost evenly divided between police (54%) and fire (46%) department employees.

Type A Interview Data

Type A behavior was measured using the Structured Interview (Dembroski, MacDougall, & Lushene, 1979). The type A behavior pattern measured with this interview has relatively strong construct validity (Ganster, Schaubroeck, Sime, & Mayes, 1991). A patterned questionnaire including 25

[1] Individuals whose resting systolic blood pressure exceeded 160 mm Hg or whose resting diastolic blood pressure exceeded 95 mm Hg were excluded from the study.

items structures the interview. Three trained persons rated the interview data using audio tapes of the interviews. There was high interrater agreement for the presence of global type A behavior ($r = .78$). Differences between raters were resolved by discussion and consensus using criteria outlined by Dembroski and colleagues. Each participant was placed in one of five categories: extreme type B ($N = 11$); moderate type B ($N = 36$); neutral ($N = 37$); moderate type A ($N = 25$); and extreme type A ($N = 12$); the categories were scored 1–5, respectively. This five-category measurement scheme was used as the analytic type A variable.

Questionnaire Measures

Cardiovascular disorder. Cardiovascular disorder was measured using the cardiovascular system subscale of the medical history instrument developed by House (1980). The scale inquires into recent medical history concerning hypertension, heart attack and heart disease, and angina. The items used in this index have demonstrated strong congruence with physicians' diagnoses in two separate clinical studies (cf. House, 1980: 233). The items are dichotomous (yes/no), but they also ask the respondent to provide detailed explanations of conditions and physicians' diagnoses. Heart trouble was measured across three levels of severity, including no past heart trouble, heart trouble that was no longer treated with medication, and heart trouble that was being treated with medication. Physician-diagnosed (but self-reported) hypertension was a dichotomous variable, as was experience of a severe angina attack. Both angina and hypertension, if untreated, are known to increase the risk of coronary heart disease three to five times (e.g., Rose, 1971). These three variables were summed to provide a composite measure of cardiovascular disorder. In the final analysis group, 23 percent of the participants had experienced at least one of these three symptoms of cardiovascular disorder in 1989. This index was transformed into standard normal deviates (z-scores).

Psychological job complexity. Psychological job complexity was first measured with the original version of the JDS. The subscales of task identity, task significance, skill variety, job feedback, and job autonomy included a total of 15 items and were collected in 1982 (time 1). The coefficient alpha reliability for the overall scale was .75.

Because JDS items were not included on the follow-up questionnaire, we used a three-item measure of skill utilization ($\alpha = .80$, time 1 and .75, time 2) as a proxy to examine changes in psychological job complexity. Reverse-scoring Caplan, Cobb, French, Harrison, and Pinneau's (1975) measure of skill underutilization provided an index of skill utilization.

Individual risk and other control variables. All control variables were measured at both times, but the analysis is based on the 1989 observations. Trait negative affectivity was measured using the neuroticism scale from the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1963). The instrument includes 23 dichotomous items (Kuder Richardson 20 = .86). Other control measures included age, gender, education, cigarette smoking volume, and body mass index, each of which is considered an influence on cardiovascular disorder. The body mass index is computed as the ratio of body weight to height, with the latter expressed in centimeters squared (weight/height [cm^2]). Occupation (fire or police department employee) was also included in the analysis. Job tenure was not included because it was highly correlated with age ($r = .91$).

Task-Person Job Complexity

Following Adelman (1987) and Hunter and colleagues (1990), we measured task-person complexity using standard DOT classifications that have been developed from observations and job descriptions of thousands of American jobs under the direction of the Department of Labor. Each of 12,099 distinct occupations reported in the DOT is coded on 44 characteristics. We coded each participant's job title on each of the characteristics, using current DOT job titles from the research sites' personnel departments. We then examined the characteristics for face validity concerning task-person complexity as Campbell (1988) defined it. The resulting characteristics were among those identified in the substantive complexity factor Cain and Tremain (1981) observed using a national random sample. Four pertinent characteristics were identified, including (1) a "worker function characteristic" for complex relationships to people, labeled "people" under the DOT classification system, (2) a worker function characteristic for complex functioning in relation to data, (3) an "aptitude characteristic" for required general intelligence, and (4) an "interest characteristic" for "abstract and creative versus routine, concrete activities."

The coefficient alpha reliability for the combined scale (four characteristics) was .90. Given the high convergence of these characteristics, we summed them to form an analysis construct we called DOT complexity. This measure of job complexity is very similar to the Hunter (1980) system of measuring job complexity, except that the present index included the people component of complexity, as did the index used by Adelman (1987). Hunter and colleagues (1990) separated sales jobs from their sample of 12,000 jobs to compute complexity indexes within the Hunter (1980) system. This distinction was needed because of the high rating on the people component of most sales jobs. The present data were more skewed to service occupations, and thus the people rating was a viable measure of complexity.

In fire and police work, jobs appear to change little until an individual advances quite far in an organization. Although it is plausible that some participants' ratings on our ultimate criteria of complexity changed over the course of the study, these changes were probably quite minor. Further, the contemporaneous effects of complexity are not as likely to significantly influence cardiovascular health as are the effects over time.

Analytic Procedures

Several alternative factor structures of JDS job characteristics have been published. The most parsimonious of these is the single-factor model Hogan and Martell (1987) obtained using confirmatory factor analysis. In order to establish the measurement model of these JDS variables, we first tested a model in which the feedback, task significance, task identity, skill variety, and autonomy components measure separate factors. This analysis used the LISREL 7 structural equations computer program (SPSS, 1990). In the core analyses, we crossed the five-point type A behavior pattern measure with both JDS and DOT complexity predicting cardiovascular illness using hierarchical regression analysis. We measured healthy persons on the focal variables at time 1 and then determined how cardiovascular disorder assessed at time 2 correlated with these variables and their products.

RESULTS

The overall measurement model specifying the five factors of task identity, skill variety, task significance, feedback, and autonomy provided a chi-square value of 160.5 ($df = 80$, $p < .05$). With an absolute null-model-chi-square fit of 1,379.3 ($df = 105$, $p < .001$), the type 2 normed fit index and the Tucker-Lewis index were .94 and .92, respectively.

We then tested the most parsimonious model, which specifies that all the JDS items capture a single common factor (Hogan & Martell, 1987). This model provided a chi-square of 125.3 ($df = 70$, $p < .05$). The normed fit and Tucker-Lewis statistics were .96 and .94, respectively. All of the factor loadings were strongly significant. This evidence suggests that the fit of this model is better than that of the five-factor version, and therefore this appeared to be a practical measurement model for substantive analysis because it was more parsimonious than other possible factor structures. We labeled this resulting factor JDS complexity.

Table 1 provides the correlations among the analysis variables. Consistent with the results of previous epidemiological research, the zero-order correlation between type A behavior and cardiovascular disorder was positive and significant in magnitude ($r = .26$, $p < .05$). DOT complexity also correlated positively with cardiovascular illness ($r = .31$, $p < .01$). JDS complexity had no main effect on morbidity, however ($r = .03$). Among the control variables, only age, smoking, and body mass were significantly correlated with cardiovascular illness.

Skill utilization correlated positively with JDS complexity ($r = .50$, $p < .001$) at time 1, and the results of paired t-tests showed no change in skill utilization over the seven-year period ($t_{122} = 1.10$, $p < .28$). Skill utilization seems closely matched with psychological job complexity, and therefore its lack of change indirectly reflects on the stability of JDS complexity.

Table 2 provides the results of the central hierarchical regression analyses. The seven control variables were entered at the first step. They explained 18 percent of the variance in cardiovascular illness. The main effect of type A behavior was entered on the next step because it consistently exhibits a relationship with cardiovascular morbidity (Matthews, 1988). Type A behavior was positively related to morbidity ($\Delta R^2 = .05$, $F_{1,101} = 5.96$, $p < .05$). The following step (step 3) incorporated the complexity factors. These main effects explained little of the variance in morbidity (ΔR^2

TABLE 1
Descriptive Statistics and Correlations[a]

Variables	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12
1. Cardiovascular disorder, time 2	0.00	1.00												
2. DOT complexity, time 1	7.64	2.37	.31											
3. JDS complexity, time 1	5.27	0.67	.03	.15										
4. Type A, time 1	2.92	1.13	.26	.19	.11									
5. Neuroticism, time 2	9.24	5.33	.08	−.03	−.12	−.01								
6. Education, time 2	14.58	1.92	−.04	.08	.02	.04	−.29							
7. Age, time 2	40.24	6.74	.38	.48	−.10	.15	.14	−.19						
8. Smoking, time 2	1.82	1.66	.25	.15	−.15	.15	.08	−.29	.26					
9. Body mass, time 2	27.04	3.88	.19	.00	−.03	−.07	.16	−.12	.22	.12				
10. Gender[b]	1.05	0.22	−.11	−.11	−.20	−.02	.11	−.05	−.27	−.12	.03			
11. Occupation[c]	1.47	0.50	−.07	.07	.09	−.01	−.23	.47	−.28	−.24	−.06	.25		
12. Skill utilization	3.20	0.87	.09	.13	.50	.14	−.18	−.10	.03	−.01	.05	−.05	.22	

[a] $N = 110$. Correlations outside the range −.19 to .19 are significant at $p < .05$.
[b] Man = 1, woman = 2.
[c] Fire department = 1, police department = 2.

TABLE 2
Results of Regression Analyses

Variables[a]	B	F	Total R^2	ΔR^2	df	F
Step 1						
Neuroticism	.04	0.2				
Education	.07	0.4				
Smoking	.19	3.7				
Gender	−.01	0.0				
Age	.32	10.3**				
Body mass	.10	1.2				
Occupation	.05	0.2				
			.1813		7,102	3.23**
Step 2						
Type A	.22	6.0*				
			.2269	.0456	1,101	5.96*
Step 3						
JDS complexity	.08	0.7				
DOT complexity	.16	2.2				
			.2531	.0262	2,99	1.78
Step 4						
JDS complexity × type A	.24	6.0**				
DOT complexity × type A	.34	12.8***				
			.4013	.1482	2,97	12.01***
Step 5						
JDS complexity × DOT complexity	−.07	0.5				
Step 6						
JDS complexity × DOT complexity × type A	.27	7.31**				
			.4472	.0425	1,95	7.31**

[a] The step 1 control variables were measured at time 2 (1989); all other variables were measured at time 1 (1982).

* $p < .05$

** $p < .01$

*** $p < .001$

= .03, $F_{2,99}$ = 1.78, n.s.), and neither complexity main effect was statistically significant. Collectively, the variables explained 25 percent of the variance in morbidity (adjusted $R^2 = .18$).

The two complexity–type A behavior product terms were entered on the next step (step 4). The overall increase in variance explained was significant ($\Delta R^2 = .15$, $F_{2,97} = 12.01$, $p < .001$), and each of the two product terms was also significant ($p < .01$). For both DOT complexity and JDS complexity, the job factor was positively related to cardiovascular morbidity among people high on type A behavior. For the 47 persons scoring 1 or 2 on the global measure of type A behavior, and thus showing type B behavior, JDS complexity was negatively related to morbidity ($r = -.30$, $p < .05$). Thus, the interactions found were as hypothesized, except that there was a significant, negative relationship between psychological complexity and morbidity among type B individuals when no relationship had been predicted.

The three-way interaction between the two complexity factors and the type A behavior pattern was tested by entering it after the three two-way interactions (Table 2, step 6). The three-way product term was statistically significant ($\Delta R^2 = .04$, $F_{1,95} = 7.31$, $p < .01$). A plot of this interaction indicated that type A individuals scoring high on both JDS and DOT complexity were significantly more at risk for cardiovascular disorder than all the type B or type A individuals who scored lower on either complexity dimension. The combined effects of all the analysis variables explained 45 percent of the variance in morbidity (adjusted $R^2 = .37$).

DISCUSSION AND CONCLUSIONS

In this study, both psychological and task-person job complexity were found to correlate positively with symptoms of cardiovascular illness measured seven years after initial measurements, but only among type A workers. Psychological job complexity was negatively related to morbidity among type B individuals. Further, significantly more morbidity was experienced by type A workers who scored high on both complexity dimensions than by type B workers and type A workers scoring low on either complexity dimension. In view of previous research and theory, a plausible explanation for these findings would be that job complexity tends to elicit time-urgent responses among type A individuals.

Type B individuals, however, do not manifest time-urgent responses, nor do they become extremely stimulated in response to high complexity. Because they may therefore perceive less threat or stress in the challenges posed by "enriched" (psychologically complex) jobs, such as high perceptual-motor demands (Campion & Thayer, 1985), continued exposure to such challenges may even regenerate their autonomic nervous systems in ways that promote long-term cardiovascular health. Karasek, Russell, and Theorell (1982) and Dienstbier (1989) described such anabolic properties of challenge, but as yet these have received no attention in research on job stress and job design. Consistent with research showing that the type A behavior pattern has a main effect on cardiovascular disorder, however, was our finding that type B individuals exhibited relatively few symptoms of morbidity regardless of job type.

The present study contributes to existing knowledge in a number of ways. First, we know of no previous study that has examined the moderating role of type A behavior on relationships between job conditions and long-term cardiovascular disorder. The prospective design of this study is an improvement over previous studies of the type A–hyperreactivity model of job stress. Second, no previous study has used type A behavior's interaction with job complexity to predict a health outcome measure. The present results suggest that job complexity, which had not previously been seen to be a stressor, had positive effects on cardiovascular disorder among those high on type A behavior.

Finer-grained analyses might reveal that other job conditions that covary with job complexity (task-person or psychological) provide a more precise description of these effects. The identification of such factors may be a fruitful avenue for job design and job stress research. As Campion and Thayer (1985) noted, excessive perceptual-motor demands, especially those that relate to information processing, may explain why people often experience enriched jobs as stressful. Those authors stated that such problems can conceivably be reduced or eliminated while the intrinsically rewarding character of the task is maintained. Such improvements in job enrichment can only be accomplished, however, if the underlying factors that create the difficulties can be identified.

It is interesting that enriched jobs were related to ill health over time among type A individuals, but these jobs are commonly found to be more satisfying than unenriched jobs (Fried & Ferris, 1987). The present results therefore call into question the conclusion that job design elements that workers find pleasing necessarily improve the quality of work life, a premise that permeates the job design literature. There is a danger that workers perceiving these job characteristics as being desirable will not cope with them in ways that minimize their cardiovascular disorder consequences.

Certain caveats pertaining to this study should be noted. First, data were predominantly provided by men in a narrow range of occupations. Second, although testing the relationship of a job characteristic with a stress outcome measured later strengthens the ability to make causal inferences, correlational evidence does not prove causality. Third, we measured JDS job characteristics for individual job holders rather than for the jobs themselves. We studied too few jobs to allow us to aggregate job perceptions to the job level and maintain adequate statistical power. Thus, although the present study's findings are relevant to the relationship between perceived job enrichment and the quality of work life, it remains to be seen whether redesigning jobs for enrichment has similar health consequences over time. Task-person complexity had isomorphic effects and considerably stronger effects than DOT complexity. However, the DOT measures were not simply objective exemplars of the task attributes measured by the JDS. The DOT provided an alternative measure of complexity that was based on demands for sophisticated reasoning, complex involvement with other people, and creativity. These are typically characteristics of professional jobs and reflect a different type of job complexity that is of interest to researchers and practitioners.

As in most prospective stress studies, somewhat fewer participants provided complete data as this study progressed. However, participant mortality was statistically unrelated to the relevant analysis variables measured in 1982. Thus, although it is plausible that cardiovascular disorder may have led to a bias against response to the follow-up questionnaire, notwithstanding the guarantees of confidentiality, any such response bias was unlikely to affect these analyses significantly. A good number of the original participants also had to be excluded from the final analysis group because of (1) evidence they had had high blood pressure or another cardiovascular disorder in 1982 or (2) their leaving their original organizations. These requirements limited the study group but assured that the study was prospective and that complexity exposures remained constant. Finally, changes in job complexity over time may have been restricted in this group because it was limited to police and fire department employees. Future longitudinal research addressing these questions might examine a population in which promotions and other job transfers lead to greater changes in complexity.

The overall findings suggest that practitioners and researchers alike should be more concerned about type A individuals and their exposures in the workplace. The main effect of the type A behavior pattern on cardiovascular disorder underestimates the health risk posed by this pattern. The greatest cardiovascular morbidity consequences were experienced by the type A individuals, people who are exhibiting behavioral patterns that are cultivated in organizations (cf. Ganster et al., 1989) and complex jobs, jobs that seem to be considered more socially desirable than simple jobs. The findings suggest tantalizing prospects for assessing the role of type A behavior in workers' reactions to job characteristics, and we would recommend that the type A behavior pattern be included in evaluations of job design. If these findings hold up against continued research scrutiny, the health of workers high on type A behavior would require either transfer to less complex jobs or training to alleviate the type A behavior pattern (cf. Friedman et al., 1984). Interventions designed to increase the complexity of jobs in order to promote satisfaction, such as job enrichment, or to professionalize a work force—by increasing task-person complexity—may have serious health consequences.

REFERENCES

Adelman, P. K. 1987. Occupational control, complexity, and personal income: Their relation to psychological well-being in men and women. ***Journal of Applied Psychology,*** 72: 529–537.

Bernstein, A., Brandt, R., Carlson, B., & Padley, K. 1992. Teaching business how to train. ***Business Week,*** Bonus Issue: 82–90.

Cain, P. S., & Tremain, D. J. 1981. The *Dictionary of Occupational Titles* as a source of occupational data. ***American Sociological Review,*** 46: 253–278.

Campbell, D. J. 1988. Task complexity: A review and analysis. ***Academy of Management Review,*** 13: 40–52.

Campion, M. A., & Thayer, P. W. 1985. Development and field evaluation of an interdisciplinary measure of job design. ***Journal of Applied Psychology,*** 70: 29–43.

Caplan, R. D., Cobb, S., French, J. R. P., Jr., Harrison, R. V., & Pinneau, S. R., Jr. 1975. ***Job demands and worker health*** (Department of Health, Education, and Welfare publication no. 75-160). Washington, DC: U.S. Department of Health, Education, and Welfare.

Contrada, R. J., Wright, R. A., & Glass, D. C. 1984. Task difficulty, type A behavior pattern, and cardiovascular response. ***Psychophysiology,*** 21: 638–646.

Dembroski, T. M., MacDougall, J. M., & Lushene, R. 1979. Interpersonal interaction and cardiovascular response in type A subjects. ***Journal of Human Stress,*** 5: 28–36.

Dienstbier, R. A. 1989. Arousal and physiological toughness: Implications for mental and physical health. ***Psychological Review,*** 96: 84–100.

Eysenck, H. J., & Eysenck, S. B. G. 1963. ***Eysenck personality inventory, form A.*** San Diego: Educational and Industrial Testing Service.

Fried, Y., & Ferris, G. R. 1987. The validity of the job characteristics model: A review and meta-analysis. ***Personnel Psychology,*** 40: 287–322.

Friedman, H. S., & Booth-Kewley, S. 1988. Validity of the type A construct: A reprise. ***Psychological Bulletin,*** 104: 381–384.

Friedman, M., Thoreson, C., Gill, S., Powell, L., Ulmer, D., Thompson, L., & Associates. 1984. Alteration of type A behavior and reduction in cardiac occurrences in postmyocardial infarct patients. ***American Heart Journal,*** 108: 237–248.

Ganster, D. C., Schaubroeck, J., Sime, W. E., & Mayes, B. T. 1991. The nomological validity of the type A personality among employed adults. ***Journal of Applied Psychology,*** 76: 143–168.

Ganster, D. C., Sime, W. E., & Mayes, B. T. 1989. Type A behavior in the work setting: A review and some new data. In A. W. Siegman & T. M. Dembroski (Eds.), ***In search of coronary-prone behavior: Beyond type A:*** 117–118. Hillsdale, NJ: Erlbaum.

Griffin, R. W. 1987. Toward an integrated theory of task design. In L. L. Cummings & B. M. Staw (Eds.), ***Research in organizational behavior,*** vol. 9: 79–120. Greenwich, CT: JAI Press.

Hackman, J. R., & Oldham, G. R. 1975. Development of the Job Diagnostic Survey. ***Journal of Applied Psychology,*** 60: 159–170.

Hackman, J. R., & Oldham, G. R. 1980. ***Work redesign.*** Reading, MA: Addison-Wesley.

Harbin, T. J. 1989. The relationship between the type A behavior pattern and physiological responsivity: A quantitative review. ***Psychophysiology,*** 26: 110–119.

Hogan, E. A., & Martell, D. A. 1987. A confirmatory structural equations analysis of the Job Characteristics Model. ***Organizational Behavior and Human Decision Processes,*** 39: 242–263.

House, J. S. 1980. ***Occupational stress and the mental and physical health of factory workers.*** Ann Arbor, MI: Institute for Social Research.

Houston, B. K.. 1988. Cardiovascular and neuroendocrine reactivity, global type A, and components of type A. In B. K. Houston & C. R. Snyder (Eds.), ***Type A behavior pattern: Research, theory, and intervention:*** 212–253. New York: Wiley.

Hunter, J. E. 1980. ***Test validation for 12,000 jobs: An application of synthetic validity and validity generalization to the General Aptitude Test Battery (GATB).*** Washington, DC: U.S. Employment Service.

Hunter, J. E., Schmidt, F. L., & Judiesch, M. K. 1990. Individual differences in output variability as a function of job complexity. ***Journal of Applied Psychology,*** 75: 28–42.

Karasek, R. A., Russell, R. S., & Theorell, T. 1982. Physiology of stress and regeneration in job-related cardiovascular illness. ***Journal of Human Stress,*** 8: 29–42.

Matthews, K. A. 1982. Psychological perspectives on the type A behavior pattern. ***Psychological Bulletin,*** 91: 293–323.

Matthews, K. A. 1985. Assessment of type A behavior, anger, and hostility in epidemiological studies of cardiovascular disease. In A. M. Ostfield & E. D. Eaker (Eds.), ***Measuring psychological variables in epidemiologic studies of cardiovascular disease*** (NIH Publication No. 85-2270). Washington, DC: U.S. Department of Health and Human Services.

Matthews, K. A. 1988. Coronary heart disease and type A behaviors: Update on and alternative to the Booth-Kewley & Friedman (1987) quantitative review. ***Psychological Bulletin,*** 104: 373–380.

Obrist, P. A. 1976. The cardiovascular-behavioral interaction—As it appears today. ***Psychophysiology,*** 13: 95–107.

Rose, G. A. 1971. Predicting CHD from minor symptoms and electrocardiographic findings. ***British Journal of Preventative and Social Medicine,*** 25: 94–96.

SPSS. 1990. ***SPSS LISREL 7 and PRELIS user's guide.*** Chicago: SPSS.

U.S. Department of Labor. 1977. ***Dictionary of occupational titles*** (4th ed.). Washington, DC: U.S. Government Printing Office.

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