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DIVERGENT EFFECTS OF JOB CONTROL ON COPING WITH WORK STRESSORS: THE KEY ROLE OF SELF-EFFICACY

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This study identifies job self-efficacy as a moderating variable that may determine whether job control contributes positively or negative to coping with work stressors. Data from two samples (health professionals and an occupationally diverse group) demonstrated similar interactions between demands, control, and self-efficacy predicting blood pressure. These results may reconcile the previous inconsistent and largely method-bound support for Karasek's job demands–control model and suggest that efforts to improve job self-efficacy may be as important to reducing the cardiovascular consequences of job stress as efforts to enhance control.

Organizations lack feasible means to reduce job stress exposures that are widely believed to have negative health consequences. Thus, the primary goal of organizational epidemiology in recent years has been to identify the conditions under which given job stressors can be implicated in the development of serious health problems. Drawing on a preponderance of laboratory research and a few field successes, writers have widely asserted that a lack of job control is the cause of poor individual coping with job stress and resultant health disorders. Karasek's (1979) job demands–control model (also known as the decision latitude model), which contains this proposition, "has provided the underlying theoretical basis for most large scale studies of job stress conducted in the last ten years" (Fox, Dwyer, & Ganster, 1993: 290). However, support for this model has been mixed at best.

In this article, we review research and theory suggesting that the demands-control model contains the assumption that jobholders have a high level of self-efficacy. Further, we suggest that control may even have adverse health consequences among those low in self-efficacy. Below we develop an extension of Karasek's (1979) model that predicts workers' resting blood pressure levels with a three-way interaction between demands, control, and

We are grateful to Kendra Reed and Alisa Mosley for their assistance in plotting the interaction findings. Steven Sommer helped us gain access to the primary research site, and Daniel Ganster permitted us to use his data for the replication analyses. Sang M. Lee provided valuable resources for the primary data collection. We also thank Daniel Ganster and two anonymous reviewers for their valuable suggestions.

self-efficacy. We tested this new model on a sample of health professionals and then replicated the findings with a more occupationally diverse sample.

THEORETICAL BACKGROUND

The Job Demands–Control Model

Presenting the job demands–control model, Karasek posited that physiological strain results "from the joint effects of the demands of a work situation and the range of decision making freedom (discretion) available to the workers facing those demands" (1979: 287). The model contains two primary predictions. First, job strain increases as job demands increase. Second, if the challenges of a job can be matched by an incumbent's ability to cope actively with those challenges (i.e., the job is high in control), appropriate behavior patterns that lead to an effective channeling of arousal occur. Thus, high-demand, high-control jobs are termed "active" and seen as not only less conducive to stress outcomes, but also as potentially leading to health improvement via anabolic processes. However, if demands are high and control is low (a "high-strain" job), arousal is not appropriately channeled and high strain is maintained. Additionally, if both demands and control are low, a job is defined as "passive," which means the job provides little opportunity for its incumbent to cope directly with job demands. Karasek, Russell, and Theorell (1982) described the mediating physiological processes (identified in animal studies) that make demands and control particularly related to cardiovascular functions such as blood pressure.

Most of the large-scale tests of Karasek's (1979) model have utilized cardiovascular outcomes. Support for the model has been mixed. In four studies,[1] researchers applying the model have predicted cardiovascular disease and myocardial infarction (e.g., Schnall et al., 1990) as well as systolic and diastolic blood pressure (e.g., Fox et al., 1993); findings regarding one of five job stressors supported the model in the latter study. Eight studies, however, have failed to support the model in results on blood pressure or other cardiovascular outcomes (e.g., Albright, Winkleby, Ragland, Fisher, & Syme, 1992). As Fox and colleagues (1993) and Landsbergis, Schnall, Warren, Pickering, and Schwartz (1994) noted, the epidemiological studies supporting the model have not explicitly tested the interaction between demands and control. Instead, they have combined demands and control data into subgroups or obtained a demands-control ratio and then correlated this with cardiovascular outcomes. Because the main effects of demands and control were not controlled for, these tests of the demands-control interaction have been inappropriately liberal. As Ganster and Fusilier concluded from their review, "The evidence for an interactive effect of control with job stressors is relatively weak" (1989: 262).

[1] A full list of these studies as well as the eight studies mentioned below is available from the authors.

The Role of Self-Efficacy

The inconsistent findings of tests of the job demands–control model may be explained by the presence of one or more unmeasured variables in the interaction. Most job stress theories acknowledge the influence of domain-specific individual differences on the relationship between job demands and health. Although Karasek (1979) suggested that individual differences may play a role in the function of job control, direct tests of the demands–control model have not addressed such variables.

As defined by Wood and Bandura, "Self-efficacy refers to beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands (1989: 408). Control perceptions capture an individual's appraisal of an objective situation (Ganster, 1989b), whereas self-efficacy is dispositional in that it measures the individual's evaluation of his or her personal ability to exercise that control. As discussed by Bandura (1986: 440–442) and Gist and Mitchell (1992: 196–198), the dispositions leading to perceived control and self-efficacy are commonly influenced by individual differences (state and trait) as well as by objective situations. Both appraisals may be distorted perceptions of actual control and efficacy. The subjective perceptions of demand, control, and self-efficacy are the primary mediators of stress reactions.

Litt (1988a) suggested that self-efficacy is critical because it affects an individual's ability and willingness to exercise control: "Judgments of self-efficacy may be such that the control provided is not useful or may even have a negative effect. Control may benefit only those who are confident that they can use it and that it will be effective. . . . In this way, then, perceptions of control in a situation and estimates of self-efficacy to use that control to advantage interact to determine how a person will appraise the situation and how much distress will be elicited" (Litt, 1988a: 253). According to Litt, people with high self-efficacy, having confidence in their ability to exercise control, should have better behavioral and psychological outcomes in high-demand, high-control situations than do people with low self-efficacy. The latter "may experience enhanced distress, possibly anxiety, if forced to assume control that they feel unprepared to use" (Litt, 1988a: 254). Litt (1988b) supported these predictions in a laboratory study of pain tolerance.

Averill's (1973) classic review of human and animal studies of control and stress noted that a sizable minority of subjects found control to be stress inducing rather than stress reducing. According to Averill, poor (or inefficient) use of control "might increase the stressfulness of a situation by providing negative feedback to the subject" (1973: 293) about his or her competence. The authors of several published laboratory studies have observed that control had aversive physiological consequences at higher levels of task difficulty (see the review by Öhman and Bohlin [1989]). Task difficulty is expected to negatively influence self-efficacy (Bandura, 1986; Gist & Mitchell, 1992). As Öhman and Bohlin stated, "Persons may perceive that events are controllable, yet completely disregard the implications of this perception

because they judge the relevant coping response as lacking from their behavioural repertoire" (1989: 261). Likewise, Fisher (1984: 229–235) reviewed evidence from a range of stress studies to suggest that *lower* control in difficult situations may reduce the stressfulness experienced by people with low self-efficacy because it enables them to make situational (versus self-directed) attributions for difficulties and failure, thereby protecting their self-esteem.

The provision of control may have salutary health effects, consistent with the demands-control model, among workers who perceive high levels of self-efficacy in relation to their job behaviors. Under these conditions, job control can be effectively utilized in coping with work stressors. As Wortman and Dunkel-Schetter (1979) suggested, high self-efficacy may likewise be *harmful* when an individual lacks control over outcomes (as with cancer treatment). People may become discouraged when their efficacy beliefs are challenged by the objective uncontrollability of a situation. These authors found that high-self-efficacy cancer patients, who expected effective control over their lives, blamed themselves for their deteriorating physical condition.

The Present Study

The research reviewed above supports Karasek's (1979) job demands–control model, but only among people who experience a sense of high self-efficacy in their jobs. Among people low in job self-efficacy, increasing control may exacerbate the stress of demanding jobs (Litt, 1988a). Bandura (1977: 84–85) noted that self-efficacy beliefs can be generalized beyond individual tasks. Recent research indicates that dispositional variables such as job self-efficacy, "interpersonal self-efficacy," "activities self-efficacy," and "coping self-efficacy" are reliable and valid predictors of behavior (e.g., Widenfeld, O'Leary, Bandura, Brown, Levine, & Raska, 1990). The dependent variables in the present research were systolic and diastolic blood pressure. High blood pressure is always in the top three predictors of cardiovascular disease in major population-based studies of cardiovascular risk. Cardiovascular disease is the leading cause of death and health care costs in the United States. Hypertension also leads to a multitude of other health problems, including stroke (the third leading cause of death among older adults) and kidney disease (Kaplan, 1986). There is a monotonic relationship between blood pressure and mortality. "Life expectancy decreases as blood pressure rises . . . . The higher the level of either systolic or diastolic blood pressure, the greater the risk of developing target organ disease secondarily" (McMahon, 1984: 3). Even mild chronic elevations of these factors are related to later cardiovascular disorder and cardiovascular disease–related mortality (cf. Baubiniene, Klumbiene, & Miseviciene, 1983).

The research and theory suggesting an interactive relationship between self-efficacy, control, and demand perceptions (Averill, 1973; Fisher, 1984; Litt, 1988a; Öhman & Bohlin, 1989) suggest the following general hypothesis and two specific hypotheses:

Hypothesis 1. The three-way interaction between perceived job demands, control, and self-efficacy will be significantly related to systolic and diastolic blood pressure.

Hypothesis 1a. At higher levels of self-efficacy, job demands will have a more positive relationship with systolic and diastolic blood pressure among subjects reporting lower control.

Hypothesis 1b. At lower levels of self-efficacy, job demands will have a more positive relationship with systolic and diastolic blood pressure among subjects reporting higher control.

In addition to testing the general and specific hypotheses, in further analyses we examined the extent to which differences in job titles predicted self-efficacy and the job perceptions of control and demands. We estimated common characteristics of the job titles included in this study from independent samples using two nationwide U.S. databases, the Position Analysis Questionnaire (PAQ; McCormick, Jeanneret, & Mecham, 1972) and the *Dictionary of Occupational Titles* (DOT; Miller, Treiman, Cain, & Roos, 1980). Correlating the perceptual measures with PAQ and DOT job ratings provided a test of the extent to which job features common to all workers sharing the same job title could explain job perceptions.

METHODS

Sample and Procedure

Data were collected on site at a large rehabilitation hospital located in the midwestern United States. The hospital provided comprehensive services in physical therapy, occupational therapy, speech therapy, psychological services, and other services for severe trauma patients. The sample consisted of 110 full-time health professionals involved in the daily administration of patient care. This sample represented 42 percent of the hospital's total workforce and 86 percent of the direct patient care workers who were the target of this study. A questionnaire was administered to each subject during his or her regularly scheduled work shift. Seventy-seven (77) direct patient care workers provided complete data on their demographic characteristics, blood pressure, and perceived job control, self-efficacy, and demands. Thus, the effective response rate was 60 percent. The mean position tenure among workers in this analysis sample was 3 years, 11 months, and the subjects averaged 15.2 years of education and 37.4 years of age. Ninety percent (90%) were women.

Measures

Self-report items were used to measure diastolic and systolic blood pressure. Thomas and Ganster (1995) and Fox and colleagues (1993) also had health professionals self-report their blood pressure, and the resulting data

indicated this was a reliable method to obtain blood pressure information. Fox and colleagues reported high internal consistency reliabilities among multiple measures taken at home and at work as well as high test-retest correlations between the home and work measures.

For all other measures, Likert-type scales were utilized. We adapted the Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs, and Rogers (1982) general self-efficacy scale to measure job self-efficacy. There were 11 items (for instance, "I am confident in my ability to perform the functions of my job") measuring job self-efficacy ($\alpha = .83$).

Ganster's (1989a) 22-item control instrument ($\alpha = .83$) measured job control. The items asked subjects how much control they possessed over various facets of their jobs (e.g., "How much control do you have personally over the quality of your work?"). The items in this instrument are similar to the "decision latitude" items used by Karasek and his colleagues; a number of items in the latter instrument (Karasek, 1979), however, have low face validity for control and may in fact measure job complexity (Ganster, 1989a: 256–257; Wall, Jackson, Mullarkey, & Parker, 1996).

Perceived job demands were measured by an adaptation of the Caplan, Cobb, French, Harrison, and Pinneau (1975) job complexity instrument. This scale contained 17 items ($\alpha = .89$) addressing the work pace, complexity, conflict, and ambiguity involved in carrying out a job.

We obtained independent measures of job complexity and job control using information from the Position Analysis Questionnaire (PAQ; McCormick, Jeanneret, & Mecham, 1972) and the fourth edition of the *Dictionary of Occupational Titles* (DOT; Miller, Treiman, Cain, & Roos, 1980). PAQ Services provided data from PAQ surveys of 6 to 72 positions scored by at least two raters for each of the nine job titles. PAQ reports with low interrater reliability were not utilized. These survey data are distinguished by 194 job elements and 45 global dimensions. The elements are based on item averages, whereas the dimensions represent cumulative factors that are weighted on the basis of historical data from nearly 40,000 jobs (cf. PAQ Services, 1990).

The PAQ provided a 16-element "job complexity" scale ($\alpha = .96$), and we computed a "substantive complexity" factor from DOT ratings (Miller et al., 1980). Substantive complexity is a composite of worker function dimensions. We also examined a variety of PAQ dimensions that related to job demands and one that measured degree of job structure.

Self-reports of gender and age were used as control variables representing the risk of high blood pressure. A review of the various literatures addressing the model variables did not identify other common correlates of the focal variables whose omission would bias the analyses. Nearly all subjects in this study were Caucasian, and thus race was effectively controlled.

RESULTS

The correlations among the central analysis variables and the demographic risk factors were consistent with previous research. Gender was

significantly correlated with both systolic and diastolic blood pressure ($p < .05$), with men having higher blood pressure. Job self-efficacy was negatively correlated with job demands and positively correlated with control. Control and demands were not correlated with blood pressure. Workers providing complete data did not differ on the control variables from those with missing data on any of the three job factors (age, $t_{103} = 0.38$, $p < .71$; gender, $t_{107} = 0.09$, $p < .93$; and job tenure, $t_{104} = 0.52$, $p < .61$).

We conducted multiple regression analyses to test the interaction of self-efficacy, perceived job control, and perceived job demands with diastolic and systolic blood pressure separately dependent (see Table 1). At the first step, we entered the main effects of age, gender, and job tenure. For systolic blood pressure, this block of variables was significantly predictive ($R^2 = .13$, $F_{3, 73} = 3.49$, $p < .02$), whereas the block was marginally predictive of diastolic blood pressure ($R^2 = .09$, $F_{3, 73} = 2.29$, $p < .085$). At step 2, we entered

TABLE 1
Results of Regression Analyses[a]

Variable	Systolic Blood Pressure		Diastolic Blood Pressure	
Step 1				
Gender	−12.94*	(−16.8)**	−8.73*	(−11.4)**
Age	0.29*	(0.27)*	0.14	(0.1)
Job tenure	0.00	(−0.0)	0.01	(−0.0)
R^2	.13		.09	
$F_{3, 73}$	3.5*		2.3	
Step 2				
Job demands	−0.04	(−373.9**)	−1.91	(−252.8**)
Control	−1.81	(−537.5**)	−0.77	(−324.7*)
Self-efficacy	2.89	(−288.1**)	−0.64	(−198.6**)
ΔR^2	.03		.01	
$F_{3, 70}$	0.72		0.35	
Total R^2	.15		.10	
Step 3				
Job demands × control	−5.73	(130.1**)	−3.83	(77.1*)
Job demands × self-efficacy	5.07	(70.9**)	8.28*	(47.6**)
Control × self-efficacy	−0.75	(100.6**)	−0.72	(61.1*)
ΔR^2	.02		.07	
$F_{3, 67}$	0.54		1.81	
Total R^2	.17		.17	
Step 4				
Job demands × control × self-efficacy	−24.49**		−14.6*	
ΔR^2	.11		.07	
$F_{1, 166}$	9.68**		5.90*	
Total R^2	.28		.24	

[a] $N = 77$. Numbers in parentheses are the unstandardized coefficients at step 4.

* $p < .05$

** $p < .01$

the main effects of perceived job demands, control, and self-efficacy. This block was not predictive of either systolic or diastolic blood pressure. The three two-way product terms were entered at step 3. This block did not approach significance for either type of blood pressure, and none of the individual interaction terms was significantly associated with blood pressure. Thus, these data did not support the job demands–control model.

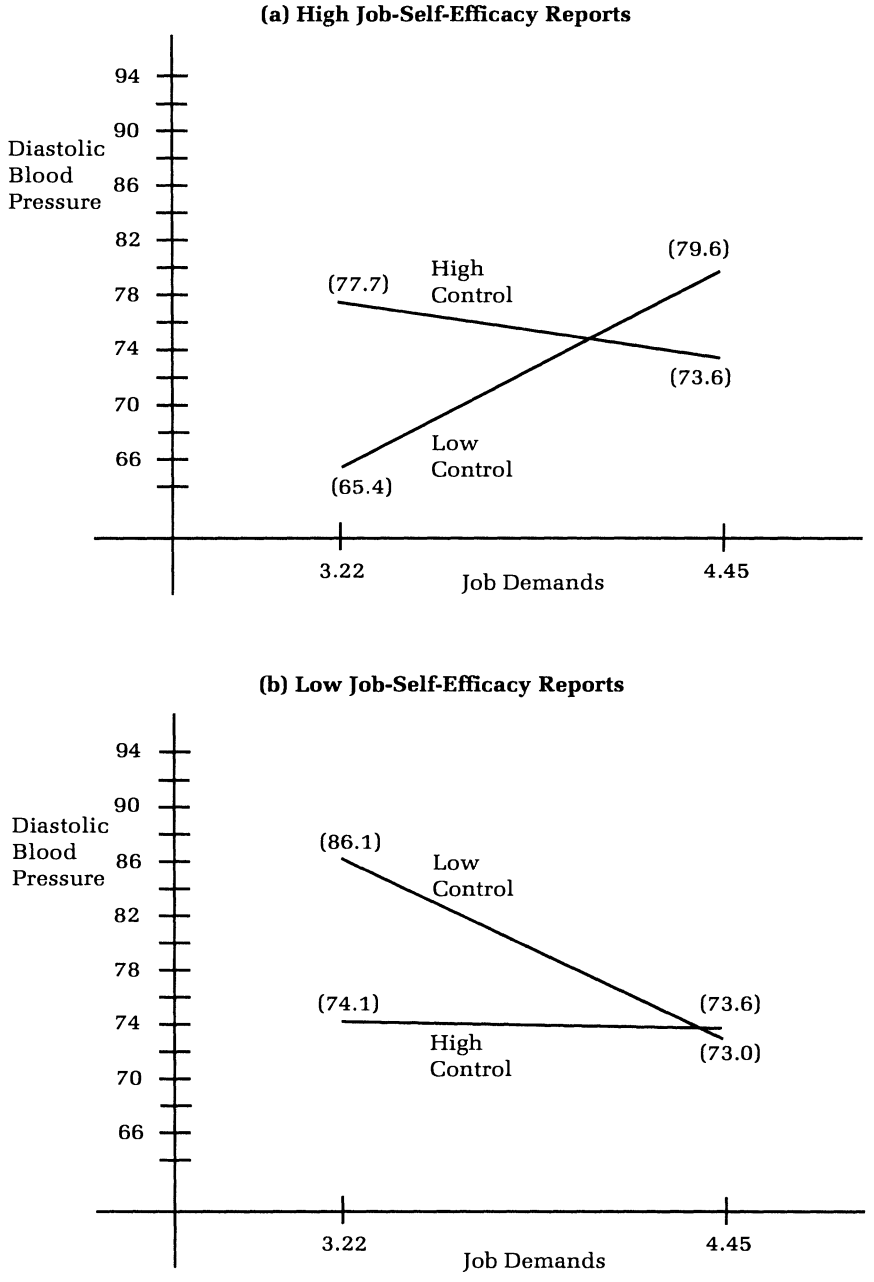
In step 4, we entered the three-way interaction between perceived job demands, control, and job self-efficacy. In support of the central hypothesis, the three-way interaction was significant with systolic blood pressure dependent ($\Delta R^2 = .11$, $F_{1, 66} = 9.68$, $p < .003$). The hypothesis was also supported with diastolic blood pressure dependent ($\Delta R^2 = .07$, $F_{1, 66} = 5.90$, $p < .018$). We plotted the three-way interactions by inserting high (one standard deviation above the mean) and low (one standard deviation below the mean) values for the three variables into the regression equation and then drawing the constituent two-way (perceived job demands by control) interactions for both high self-efficacy and low self-efficacy. In support of Hypothesis 1a, the job demands–control model was supported among workers who reported *high* self-efficacy. Job demands were more positively related to systolic and diastolic blood pressure among workers lower on control. Among those with *low* self-efficacy, demands were positively related to blood pressure when control was higher, supporting Hypothesis 1b (see Figures 1 and 2).

We constructed job title dummy variables to provide contrasts between the different jobs in the sample. The block of nine dummies was not significantly related to perceived control ($R^2 = .16$, $F_{8, 60} = 1.47$, $p < .19$). Job contrasts were strongly related to self-efficacy ($R^2 = .38$, $F_{8, 60} = 4.63$, $p < .0002$) and perceived job demands ($R^2 = .26$, $F_{8, 60} = 2.70$, $p < .013$). These results suggest that self-efficacy and job demands, but not perceived control, may be a function of job characteristics common to incumbents of the same job, not just idiosyncratic perceptions and experiences.

The PAQ and DOT variables that were expected to represent job complexity correlated significantly with the perceived job complexity (or job demands) measure used to test the hypotheses. The PAQ Job Complexity and DOT Substantive Complexity factors, which are commonly used in research, correlated strongly with each other ($r = .90$) as well as with perceived job complexity ($r = .53$, PAQ; $r = .57$, DOT). The posited job control measures from the PAQ, however, did not correlate with each other or with perceived control. In conjunction with the job title contrasts discussed above, these results suggest that common characteristics affect individual job complexity and job self-efficacy perceptions. However, the correlations are not high enough to suggest that individual experiences play a lesser role in these perceptions. Job control perceptions, on the other hand, were again found to be more idiosyncratic to job incumbents.

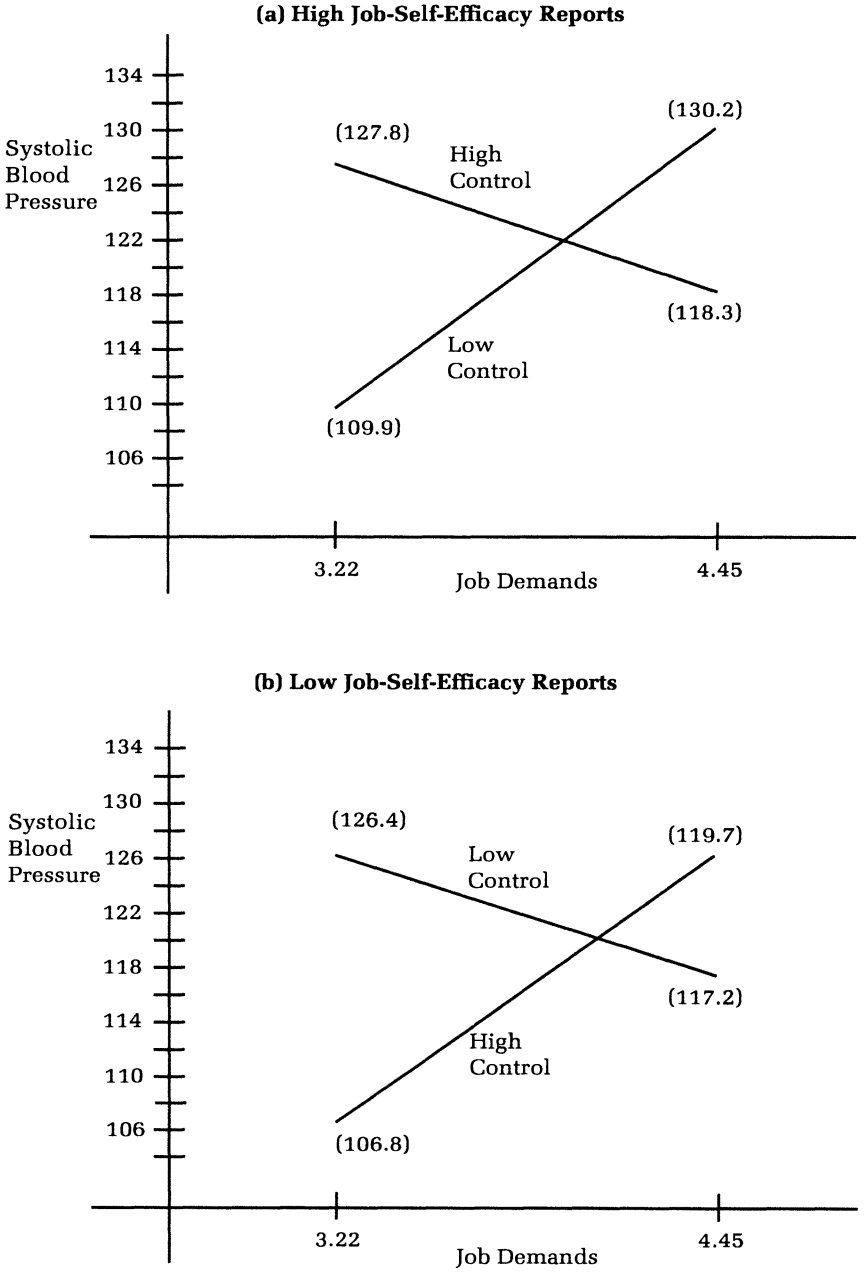
We attempted to replicate the central findings using a sample consisting of 214 employees of a large contracting firm in the midwestern United States. These workers were surveyed and interviewed as part of a larger study. Diastolic and systolic blood pressure were measured as the mean of three

FIGURE 1
Interaction between Job Demands and Control Predicting Diastolic Blood Pressure[a]



[a]The value for high job self-efficacy was 6.17; low job self-efficacy was 4.67. High control was 3.39; low control was 2.24.

FIGURE 2
Interaction between Job Demands and Control Predicting Systolic Blood Pressure[a]



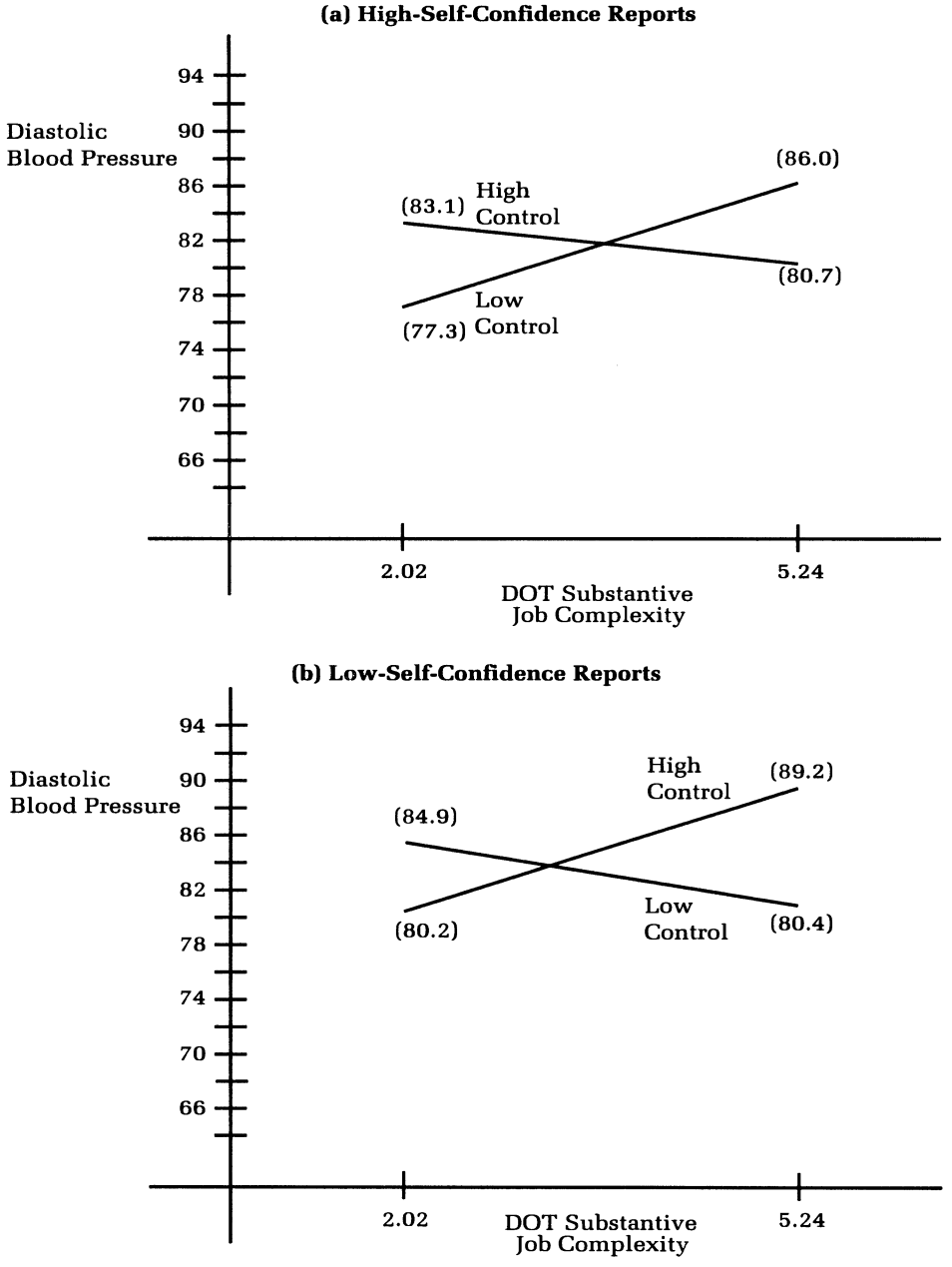
[a]The value for high job self-efficacy was 6.17; low job self-efficacy was 4.67. High control was 3.39; low control was 2.24.

resting measures taken at six to seven minute intervals just prior to administration of a stressful task. Correlations among the diastolic blood pressure readings ranged from .80 to .88, and those among the systolic blood pressure readings ranged from .78 to .88. These measures were obtained by a trained member of the research team using an IBS SD-700 Digital Monitor. Individual difference control variables included body mass index (weight [kg]/height [cm^2]), lack of aerobic exercise, gender, and age. Other possible risk factors, including cigarette smoking, caffeine consumption level ([number of cups of coffee + number of cups of tea] + [.5 × number of cans of caffeinated soda]), and type A behavior, did not correlate significantly with blood pressure; we observed that these risk factors had negligible influences on the results when they were included in post hoc regression analyses. Control was measured using the 16-item original form of Ganster's (1989a) instrument, and the DOT dimension, "direction-control-planning," provided an independent, job analysis–based assessment of control. The work stressor measures were developed by Caplan and colleagues (1975). These included quantitative workload, responsibility for others, lack of co-worker social support, lack of supervisor support, DOT substantive complexity (Miller et al., 1980), and psychological job complexity (Hackman & Oldham, 1975). The average correlation among these work stressor measures was .08. Self-efficacy was measured by proxy, combining the following two items reflecting activity-related self-confidence: "I am able to do things as well as most other people" (1 = strongly disagree, 5 = strongly agree) and "Choose a letter which describes where you fall on the scale. . . ." (A[1] = not at all self-confident, E[5] = very self-confident).

The first model was an omnibus test of the interaction hypotheses. This test included the main effects of the control variables (age, gender, body mass, exercise) and the theoretical variables (12 in all), all two-way interactions (13 in all), and the 6 three-way (work stressor by control by self-confidence) interactions. The main effects of the 6 work stressors were not significant for diastolic ($\Delta R^2 = .03$, $F_{6,\ 169} = 0.91$, $p < .49$) or systolic ($\Delta R^2 = .01$, $F_{6,\ 169} = 0.34$, $p < .92$) blood pressure. In addition, the blocks of two-way interactions were not significant for diastolic ($\Delta R^2 = .05$, $F_{13,\ 156} = 0.77$, $p < .69$) or systolic ($\Delta R^2 = .02$, $F_{25,\ 156} = 0.33$, $p < .99$) blood pressure. Thus, the job demands–control model was not supported. The hypothesized three-way interactions were significant for both diastolic ($\Delta R^2 = .15$, $F_{6,\ 150} = 6.17$, $p < .00001$) and systolic ($\Delta R^2 = .09$, $F_{6,\ 150} = 3.57$, $p < .003$) blood pressure.

Examined individually, 7 of the 12 three-way interactions were statistically significant, and all but 2 (responsibility for others and supervisor social support) of the 6 job stressors were predictive of at least one blood pressure index in three-way interaction with control and self-confidence. Each of the constituent two-way (work stressor by control) interactions was consistent with Hypotheses 1a and 1b. The three-way interaction involving DOT substantive job complexity predicting diastolic blood pressure, which is representative of the overall pattern, is shown in Figure 3. (A detailed description of these results is available from the first author.)

FIGURE 3
Interaction between DOT Substantive Job Complexity and Control Predicting Diastolic Blood Pressure[a]



[a]The value for high self-confidence was 4.63; the value for low self-confidence was 3.37. High control was 3.49, and low control was 1.93.

DISCUSSION

In these data, self-efficacy proved to be a determinant of the form of the interaction between job demands and control predicting blood pressure. Among those high in self-efficacy, the results matched predictions for the demands-control model. When people are confident in their abilities, having control mitigates the stress consequences of demanding jobs. A lack of control may be particularly harmful for people with high self-efficacy in demanding circumstances because uncontrollable situations may challenge personal agency perceptions. Such people are more likely than others to blame themselves for an inability to cope with demands. Consistent with Litt's (1988a) theorizing, however, high control combined with high job demands had negative health consequences among those reporting lower self-efficacy. People who are not confident in their mastery over job content may be distressed by the greater responsibility for dealing with demands that stems from control. When control is low, however, the environment may be seen as controlling outcomes, and for these workers, demands will not have as strong an effect on cardiovascular symptoms. In fact, demands were negatively related to blood pressure among people low in self-efficacy reporting low control conditions. These results were essentially replicated in a secondary data analysis of a more occupationally diverse sample that included multiple work stressor measures. If self-efficacy had not been included as a moderator in these analyses, this would be yet another study that failed to support the demands-control interaction.

Field interventions founded on the job demands–control model focus on increasing job control. At least for the present sample, such efforts will likely reduce stressfulness only among individuals who experience a high level of mastery in their jobs. Low-self-efficacy people may suffer even more after increases in control. Thus, raising self-efficacy may be just as important as increasing control to reducing the cardiovascular effects of job demands. The self-efficacy literature provides a number of approaches organizations might use to raise workers' self-efficacy (cf. Gist & Mitchell, 1992). Gist, Schwoerer, and Rosen (1989) and Gist (1989) compared modeling with more traditional training approaches (e.g., lectures), and both studies found that behavior modeling was more effective at raising self-efficacy. Seligman (1991) researched and popularized an alternative approach to increasing efficacy that focuses on changing causal explanations for task outcomes. It is possible that workers' self-efficacy can be enhanced by training them to make internal, stable attributions for successes and external, unstable (or specific) attributions for failures and difficulties. Because the previous self-efficacy research indicates that such interventions increase skill acquisition and motivation, they are justified on practical grounds—even if the present findings, which indicate that such interventions may enhance worker well-being, are not considered.

As Ganster (1989b: 18–19) argued, workers must be aware of how much control is at their disposal if they are to cope effectively with job demands.

In this study, job title contrasts were unrelated to perceived control, and independent assessments of job control (using the PAQ) did not correlate with perceived control. According to Fox and colleagues, "The construct of most importance is an individual's personal belief in his or her control over a work situation. This meaning is clearly evident in Karasek's (1979) initial work and follows from an extensive body of work in experimental psychology" (1993: 291–292). Thus, managers implementing job redesign interventions designed to increase employee control in order to reduce health risks should be sure (1) that employees are confident of their abilities to utilize this control and (2) that each employee directly experiences the enhanced control. Employee involvement in job redesign may be essential for both purposes.

Control and job demands had no main effects on blood pressure, with only one exception in both sets of analyses. (Responsibility for others correlated significantly [$r = .15$, $p < .05$] with both blood pressure indexes in the replication sample, but the effect was no longer significant after addition of the control variables.) This observation is consistent with previous organizational research focusing on blood pressure as a dependent variable. Not 1 of 12 published tests of the demands-control model and blood pressure has reported job demand main effects on blood pressure. Many members of the medical research community do not consider stress to be a major precursor of hypertension. This view may be explained by the weak zero-order correlations of stress-related variables with blood pressure as well as the failed efforts to reduce blood pressure through stress management (Hypertension Prevention Collaborative Research Group, 1992; Markovitz, Matthews, Kannel, Cobb, & D'Agostino, 1993). The present findings suggest that stress should be taken more seriously, depending on the specifics of each person's job situation. Thus, a more refined treatment of individual stress, one informed by the job stress literature, may aid in the identification of a proper course of treatment for high blood pressure.

Future studies might improve on the present one by examining larger, more occupationally diverse samples in order to increase the variances of the variables (to obtain stronger effects) as well as to test the generalizability of the expanded model. However, self-efficacy may have different implications for different occupational groups, and thus separate analyses for different occupational groups may be needed. For example, having low job self-efficacy may have stronger implications among nurses and doctors than among college professors, because task failures have greater consequences for health practitioners. Self-efficacy may also be uniformly high among workers in simpler occupations.

Longitudinal data would be more useful for examining causal hypotheses. Ideally, data on the predictor variables would be collected prospectively, and then symptom data would be collected years later, as has been done in a few of the major tests of the job demands–control model (e.g., Alterman, Shekelle, Vernon, & Burau, 1994). Finally, additional cardiovascular outcomes, such as heart disease and arterial disorder, should be ex-

amined. The present study focused on blood pressure because it is a major predictor of cardiovascular disease, stroke, and kidney disease that has showed some cross-sectional variability in samples of working adults. Thus, we encourage further refinements in research models of work stress that represent attempts to explain how, and under what conditions, stress undermines health.

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