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Individual Differences in Utilizing Control to Cope With Job Demands: Effects on Susceptibility to Infectious Disease

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This study examined the interactive effects of job demands, control, and individual characteristics on upper respiratory illnesses and immune function. Having high job control appeared to lessen the linkage between job demands and poor health among individuals with high self-efficacy and those who perceived that they were not often responsible for negative job outcomes. Conversely, having high job control exacerbated the association between job demands and poor health among inefficacious individuals. Implications for promoting more healthful work environments and facilitating employee coping are discussed.

The worldwide movement toward flatter and more networked organization structures has been linked to an increase in responsibilities and workloads for many employees. These demands have been separately shown to create psychological and physical health problems (DeFrank & Ivancevich, 1998). Given that the trend of increasing job demands is not likely to reverse in the near future, how to increase the healthfulness of the work environment without reducing demands has become a crucial issue. Well-managed organizations recognize that employees will be more effective when they are given more control over how they meet their increasing job responsibilities. The provision of discretion and initiative to the person who must act, who has the best information, and who must be accountable for the outcomes is indeed a basic objective of this increasingly popular organization design philosophy (Kalleberg, Knoke, Marsden, & Spaeth, 1996; Morris, 1995). The idea of personal control also underlines many conventional managerial interventions such as job enrichment, empowerment, and worker participation in decision making (Ganster & Fusilier, 1989). In research on job stress, leading thinkers have viewed worker control as a moderator of the relationship between job demands and stress. While job control has been commonly regarded as an important determinant of quality of working life, its role as a moderator of the effects of job demands on health is not often supported.

Whereas many people respond favorably to the provision of control, as we review in this paper, it seems that for others control can actually exacerbate the unhealthful effects of stress. In a wide variety of stress theories, such as person-environment fit theories and appraisal-based theories (e.g., Lazarus & Folkman, 1984), stress is seen as a function of the interaction between situational features and individual dispositions. The present study therefore aimed at exploring the individual differences that may influence the effective utilization of job control in coping with stressors. Toward this end, we extended Karasek's (1979) job demands-control model by incorporating individual characteristics into the interaction between job demands and control. In the study reported below we tested how job demands, perceived job control, and two individual differences associated with how people utilize control, interactively predicted susceptibility to infectious disease. In addition, whereas cardiovascular, somatic, musculoskeletal, and psychological strain outcomes are often researched in the workplace, a plausible link between work stressors and infectious disease has received little attention among researchers. The linkages between susceptibility to these diseases and work stress identified here suggest ways organizations might reduce their human and economic costs by increasing job control and equipping workers psychologically to more effectively utilize control.

The Role of Control in Coping With Demands

Within the last 35 years, many laboratory studies demonstrated that people who have the resources they require to resolve difficulties tend to suffer fewer physiological and psychological consequences following exposure to stressors (see Ganster & Fusilier, 1989). Several studies have attempted to extend these findings to organizational settings involving chronic stressors. Karasek (1979) developed the very influential job demands-control model, also

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known as the decision latitude model. The model posits that control buffers workers from unhealthful effects of demanding jobs. It predicts that jobs combining high demands and high control enhances opportunities for problem-focused coping. As a result, incumbents of these jobs are predicted to suffer fewer health consequences than those who encounter high job demands but have little control. Although the main prediction contained in this model is a multiplicative interaction between job demands and control, tests of the model have often focused on the main effects of demands and control. Very few studies that have explicitly tested the demands-control interaction have supported the model (see Fox, Dwyer, & Ganster, 1993; Landsbergis, Schnall, Warren, Pickering, & Schwartz, 1994; Wall, Jackson, Mullarkey, & Parker, 1996).

The Present Study

Job Stressors and Susceptibility to Infectious Disease

The present study focused on a set of outcome variables representing susceptibility to upper respiratory disease. Upper respiratory infections include bronchitis, laryngitis, influenza, pharyngitis, the complex of "common cold" viruses, as well as streptococcal and pneumococcal bacterial infections (Gwaltney, 1995). As reviewed by S. Cohen (1996), recent advances in medical science have suggested that there is a linkage between exposure to chronic stress (e.g., chronic life stressors) and one's susceptibility to infectious disease, especially upper respiratory infection. Among the different pathways by which stress may lead to infectious disease, the most plausible mechanism is thought to be reduced immune function (immunosuppression; S. Cohen). Nevertheless, very little research has investigated the relationship between job stress and immunosuppression. Moreover, to our knowledge no research has explored the linkage between job stress and infectious disease.

Infectious disease accounts for heavy losses of productive work hours (Gwaltney, 1995). Symptoms of physical disease are rated by workers as the strongest reason for absenteeism from work (Johns & Xie, 1998). Moreover, given their contagious nature, infectious illnesses often ramify via casual transmission, thus creating significant disease prevalence in work units. Identifying the linkages between work stress and these diseases will suggest means to better cope with job stress, thus helping reduce the human and economic costs of infectious illness.

The present study examined the effects of job stressors on both symptoms of infectious disease and Immunoglobulin-A (IgA). IgA is an antibody that attacks disease cells that are associated with upper respiratory infection. Among the few studies investigating the effects of job demands on immune function, inconsistent results have been reported. IgA was uncorrelated with actual or perceived workload in the studies of Zeier, Brauchli, and Joller-Jemelka (1996) and Endresen et al. (1991). However, IgA was positively related to job stress in a study conducted by Henningsen et al. (1992). It should be noted that these studies used small and occupationally homogeneous samples. Moreover, they focused on zero-order correlation analyses. This study differs from the previous studies in three respects. First, it assessed both self-reported upper respiratory illness and an antibody (IgA) that protects the body against these diseases. Second, it used a sample that was larger and more occupationally heterogeneous than previous job stress-immunity studies. Finally, it probed the *interactive* relationships between job perceptions and the jobholder's psychological dispositions in predicting his or her susceptibility to infectious disease.

Individual Differences in the Interaction Between Job Demands and Control

As noted above, stress researchers have long recognized that individual differences in cognitive processes are critical to understanding the effects of stress on health. This study focused on two individual characteristics that represent predispositions to assess situations in particular ways: perceptions of personal responsibility for negative job outcomes and job self-efficacy. Fisher's (1984) cognitive model of the stress process provided a theoretical basis for our investigation. According to Fisher, stress results from various evaluations the worker makes about his or her ability to cope with job problems. Distress that leads to negative health consequences is likely to occur when the worker does not effectively utilize the resources he or she has to control events. Both self-efficacy and the tendency to blame oneself for negative outcomes are seen as determinants of effective or ineffective utilization of control in coping with demands.

Interaction of job demands, control, and explanatory style. People have different explanatory styles that affect their decisions about whether to exercise control options (Seligman, 1990). Explanatory style contains multiple dimensions that represent the various kinds of attributions made by individuals about the causes of outcomes that occur in their lives. These dimensions include internality, stability, globality, and controllability. Because people respond differently to positive outcomes than they do to negative ones, each dimension of explanatory style can be further differentiated by sign (positive or negative) of the outcome about which the individual makes attributions (Seligman, 1990). The present study focused on controllability because we predicted that it affects how people respond to having more or less control. Controllability refers to the beliefs one holds about his or her personal causal role in the development of favorable or unfavorable outcomes. Controllability is conceptually related to the internality dimension of explanatory style in that high controllability also implies high internality. When someone makes an attribution that an outcome was controllable by himself or herself, he or she is also making an internal attribution. Thus high controllability is a specific type of internal attribution. It is a more specific dimension of internality because the latter refers to various kinds of internal causes, whereas controllability refers to only those internal causes under the actor's control. In theory an outcome may be attributable to oneself but not under one's control. For example, a failure may be caused by an aptitude deficit that was not personally preventable. In addition, the controllability factor examined in our research model is concerned only with negative outcomes. Thus, persons who score high on this aspect of controllability may be seen as having a proclivity toward characterological self-blame. The presence or absence of characterological self-blame may determine whether one chooses to utilize control opportunities to cope with stressful situations (Fisher, 1984).

Because controllability is semantically linked to other constructs, it is important to note how it is different from similarly

labeled constructs. For example, controllability is different from internal-external locus of control. Internal-external locus of control refers to generalized expectancies concerning positive, neutral, and negative outcomes (Rotter, 1966). Controllability for negative outcomes refers to the tendency for an individual to attribute *negative* outcomes to his or her own behavior. Likewise, controllability is distinguished from job control because job control is a situational perception whereas explanatory style (controllability) is dispositional. Explanatory style in general has exhibited a fairly high degree of stability among individuals over time (e.g., Golin, Sweeney, & Schaeffer, 1981), but the test-retest correlation evidence is not so strong as to demonstrate that explanatory style is a personality trait. In addition, the perception that one has high job control does not automatically imply that one has the ability to prevent negative outcomes from occurring. Rather, job control refers only to the extent the worker can choose the types of behaviors needed to complete a task or duty (i.e., behavioral control) and he or she can make decisions that affect his or her work, or both (i.e., decisional control; Averill, 1973). Given the semantic overlaps, hereafter we refer to controllability for negative outcomes as "explanatory style (controllability)." We leave it implicit that the types of outcomes are negative in sign, meaning they have some aversive, stress-producing consequences for the individual.

Persons who have a proclivity to blame themselves for negative outcomes (i.e., having a high rating on explanatory style [controllability]) are likely to relinquish their opportunities to use job control to assist in coping with job problems because they have an exaggerated sense that failure is caused chiefly by their own behavior. These individuals tend to view problem-focused coping as fruitless, irrelevant, or even as threatening because failures in coping validate a negative self-image. This prediction is contained within Abramson, Seligman, and Teasdale's (1978) theory of learned helplessness. These authors noted that such personal attributions have profound effects on how people react to the provision of control in stressful situations. A learned helplessness perspective suggests that some workers ignore or relinquish control options because they expect that their personal coping efforts inevitably lead to negative outcomes. For these persons control opportunities are avoided or ignored. Therefore, control will not moderate the effects of demands on health among these persons. Only persons who do not have a proclivity toward self-blame for negative personal outcomes are expected to fully utilize the coping options afforded by high job control. Fisher's (1984) integrated model of stress and cognition draws on the learned helplessness perspective. Her model asserts that the attributions people make for why they lack coping facility are major determinants of effective coping behavior. Persons who do not consistently blame themselves for negative outcomes tend to attribute failures either to external or unstable causes. They are more likely to utilize job control to generate an effective response to stress than are individuals having tendencies toward characterological self-blame.

Hypothesis 1a: For individuals with strong tendencies to blame themselves for negative job outcomes, job control will not moderate the relationship between job demands and health.

Hypothesis 1b: For individuals with weak tendencies to blame themselves for negative job outcomes, high job demands will be more strongly associated with poor health for individuals with low job control than for those with high job control.

Interaction of job demands, control, and job self-efficacy. Schaubroeck and Merritt (1997) identified job self-efficacy as an individual characteristic that differentiates whether a person utilizes control effectively or to his or her detriment. Self-efficacy refers to one's level of confidence in mobilizing the energy and choosing the appropriate response strategy in a given task situation (Wood & Bandura, 1989). Job self-efficacy refers to efficacy cognitions that are generalized across the various tasks that comprise a job. In the Schaubroeck and Merritt (1997) study, job control was found to buffer the negative effects of demands on health among the more efficacious workers, whereas it had the opposite effects among the more inefficacious ones. The present study extended Schaubroeck and Merritt's (1997) research on the three-way interactive effects of job demands, control, and job self-efficacy on health.

Faced with high job demands, efficacious workers need job control to employ problem-focused coping to resolve their job problems. Inefficacious workers, however, find job control stressful. This is because having high control places them in a psychologically threatening position, thus leading to negative emotions associated with self-blame. These negative emotions presage various forms of illness. This perspective is in keeping with Fisher's (1984) framework.

The psychological and organizational literatures contain a number of alternative explanations for the role of self-efficacy in the demands-control interaction. Averill (1973) suggested that poor utilization of control makes a stressful situation worse because it sends "negative feedback" to the individual (p. 293). Ohman and Bohlin (1989) suggested that persons with low efficacy disregard their perceived level of control "because they judge the relevant coping response as lacking from their behavioral repertoire" (p. 261). Although deriving from different standpoints, all of these perspectives suggest that the predictions of Karasek's (1979) demands-control model apply to efficacious individuals but not to inefficacious ones.

Like Averill (1973), Fisher acknowledged that low efficacy often makes having control in high demand situations more stressful because it promotes self-blame for the negative outcomes that result from inadequate responses to the demands. Among inefficacious persons, on the other hand, a lack of control can be salutary because it prevents self-blame for poor coping. It enables them to make a situational attribution for their difficulties. Although this does not protect them from the objective consequences of an inability to cope actively with the situation, unlike efficacious persons, they are not likely to experience the frustration associated with an inability to exercise personal capabilities. Rather, it is the provision of control they find debilitating because it places them in a position in which they expect to fail. Consequently, they become anxious and self-recriminating, and this predisposes them to reduced immune function and various forms of illness.

Fisher's (1984) framework also predicts the psychological response of an individual who judges himself or herself to have an adequate response repertoire (high efficacy) but who recognizes that the facility for control is not available (low control). Fisher predicted that such individuals would tend to attribute negative

outcomes to situational factors. This prevents despair and thus buffers them from negative health consequences. If a high efficacy person attempts to exercise control but in fact possesses very little control, however, he or she will be prone to engage in a prolonged struggle that likely results in failure. In such cases, efficacy beliefs are challenged, and frustration and its associated unhealthful physiological responses occur. Thus, low control is unhealthful for efficacious individuals because they are unable to actively resolve their job problems.

Hypothesis 2a: At low levels of job self-efficacy, high job demands will be more strongly associated with poor health for individuals with high job control than for those with low job control.

Hypothesis 2b: At high levels of job self-efficacy, high job demands will be more strongly associated with poor health for individuals with low job control than for those with high job control.

Examining the role of self-efficacy in how people respond to general features of job demands and control requires a commensurately generalized concept and measure of self-efficacy. Bandura (1997) emphasized that self-efficacy refers not to beliefs about specific actions, but to complexes of beliefs from which the individual commonly samples in different spheres of activity. Moreover, experiences in one sphere of activity influence beliefs in other spheres. Persons scoring high on job self-efficacy are seen to have considerable confidence in their job-related abilities and other resources (e.g., energy, influence over others) needed to function effectively on the job. Job self-efficacy has demonstrated significant relationships with other variables in previous organizational research (e.g., Eden & Kinnar, 1991; Gardner & Pierce, 1998; Riggs, Warka, Babasa, Betancourt, & Hooker, 1994; Schwoerer & May, 1996; Speier & Frese, 1997).

Whereas controllability for negative outcomes and self-efficacy are both agency-relevant self-perceptions, they are distinctly different. An inefficacious salesman may lack confidence in his ability to fulfill his personal behavior-outcome expectancies, but he does not necessarily blame himself for all lost sales. Self-efficacy is not the only factor that affects self-diagnostic processes following success or failure (Bandura, 1997); explanatory style may well be an additional dispositional factor in these processes.

Summary. To summarize the conceptual discussion above, job control is effectively used among persons who have either a low propensity for self-blame for negative outcomes or high job self-efficacy. When such persons are deprived of control, they are unable to cope actively and they are frustrated by their inability to exercise agency. Among persons with high explanatory style (controllability), control opportunities tend to be avoided, whereas low efficacy persons find high control to be distressing because it promotes self-blame.

Job stressors. The life stress research that has examined symptoms of upper respiratory infection has found that chronic psychosocial stressors (i.e., based on interactions with others that have psychological implications) are most related to disease incidence and severity (S. Cohen, 1996; S. Cohen, Tyrrell, & Smith, 1993; Turner-Cobb & Steptoe, 1996). Accordingly, for the present research we examined two job demands that are psychosocial in nature: responsibility for others and job complexity. These variables are among the stronger predictors of physical health outcomes in a longstanding series of research studies undertaken by the University of Michigan's Institute for Social Research (ISR; e.g., Caplan, Cobb, French, Harrison, & Pinneau, 1975; House, 1980; House, Strecher, Metzner, & Robbins, 1986). Having responsibility for the work and welfare of others creates demands on the individual's time and energy, and issues of personal blame for others' problems can make it a distressing burden. Thus, responsibility for others is frequently found to predict physical and psychological health outcomes. As noted in a review by Campbell (1988), job complexity has been defined and measured in various ways by researchers. Our approach is in keeping with the psychological form of job complexity examined by ISR researchers (e.g., House, 1980), wherein mental and interpersonal demands are of focus. This kind of job complexity is often found to correlate positively with job and work satisfaction, but it is also linked positively to physical illness outcomes (Reynolds, 1997; Xie & Johns, 1995).

Method

Sample and Procedure

Questionnaires and saliva samples were collected from the full-time employees of the headquarters of a major survey research organization in the midwestern United States. Participation was voluntary. Respondents entered a large seminar room. They were instructed to relax while a member of the research team briefed them, either singly or in small groups, about the nature of the study. After saliva samples were collected, participants completed the questionnaire in a quiet room. Of 227 questionnaires collected, 217 included complete data. This represented 59% of the workforce that was at work during the data collection.

The sample contained all 24 occupational categories within the organization, such as market research interviewer, data analyst, and building maintenance deputy. The average respondent's age was 36.84 years, and 62% of participants were women. Respondents averaged 7.31 years in the organization and 4.29 years in their current position. The mean level of education was quite high, averaging 0.58 years of postgraduate education. Archival data indicated that the overall organization did not differ significantly from the sample in terms of gender, education, or income.

Measures

Immunoglobulin-A (IgA). IgA was collected from saliva samples. Each participant was given a specially designed plastic tube, called a salivette. This tube contained a small sterile cotton wool roll. The participant was instructed to mouth-wet the roll to a state of complete saturation and seal the roll in the tube. Biochemists from the Department of Animal Science laboratories of a large research university subjected these samples to an enzyme-linked immunosorbent assay (ELISA) procedure. Two separate tests were performed for each participant. The results from the two tests correlated significantly ($r = .95$), and paired t tests indicated no difference between their means ($t = 1.36$, $p < .20$). Accordingly, the mean of these two measures was used in the subsequent analyses. A higher value of IgA means better disease resistance. Of the 220 saliva samples, 12 samples could not be assayed because they did not have sufficient saliva volume.

Upper respiratory illness symptoms. Measures of recent and chronic symptoms of upper respiratory infections were adapted from a variety of existing inventories (e.g., Ware, Johnston, Davies-Avery, & Brook, 1979). The measure of chronic infection contained six items (e.g., "In the winter, do you usually cough several times first thing in the morning?" $\alpha = .83$). Recent upper respiratory illness, referring to symptoms that occurred within the past 3 months, was also measured with six items ($\alpha = .88$). Three items focused on coughing and sputum production, and the other three on upper respiratory illness caused by an infection (e.g., sore throat and flu). The respondent was asked how many occasions he or she had

experienced a symptom, how long the longest illness lasted, 1 (*one day*) to 5 (*three weeks or longer*), and how severe the most severe illness was, 1 (*very minor*) to 7 (*very severe; required doctor's attention*).

Previous research has demonstrated strong convergence between self-assessments of colds and physician ratings (MacIntyre & Pritchard, 1989) and that people tend to accurately recall previous health symptoms over a 3-month period (G. Cohen & Java, 1994). In addition to respiratory illness, the latter study examined psychological strain and other health indexes that may be more difficult to recall. Our illness reports meet criteria that Miller, Cardinal, and Glick (1997) suggested for accurate retrospective self-reports: (a) The reports are about facts and concrete events, not opinions or beliefs; (b) they are not referring to experiences from the distant past; and (c) respondents were motivated to provide accurate information. Respondent motivation was encouraged by collecting the data at a time that was convenient for the participants, communicating to participants the very strict controls we would maintain to ensure privacy and confidentiality, and giving brief lectures about the importance of the study.

Job demands. As noted above, this study examined two job demands: responsibility for others and job complexity. We adapted the measures of both demands. The original Institute for Social Research (ISR) measure of job complexity (House, 1980) was shortened to six items (e.g., "How often are you required to coordinate your work with other individuals or departments?" 1 [*almost never*] to 5 [*very often*]; $\alpha = .78$). The scale measuring responsibility for others (Caplan et al., 1975) included three items (e.g., "How much responsibility do you have for the work results of others?" 1 [*almost none*] to 5 [*almost total*]; $\alpha = .73$).

Job control. Job control was measured with the 17-item scale of perceived control (see Smith, Tisak, Hahn, & Schmeider, 1997; e.g., "How much control do you have over how fast or slowly you have to work?" 1 [*almost none*] to 5 [*almost total*]; $\alpha = .88$) that was drawn from a longer instrument developed by Ganster and his colleagues (e.g., Fox et al., 1993). Following Averill's (1973) typology, these items measure behavioral and decisional aspects of control.

Job self-efficacy. Job self-efficacy was measured using the 10-item Personal Efficacy Beliefs Scale (Riggs, Warka, Babasa, Betancourt, & Hooker, 1994; e.g., "I have confidence in my ability to do my job," 1 [*very inaccurate*] to 6 [*very accurate*]; $\alpha = .74$).

Explanatory style (controllability). The negative items from the "controllability" subscale of Furnham, Sadka, and Brewin's (1992) explanatory style instrument were used to measure explanatory style (controllability). This measure included five hypothetical outcomes that would likely be seen as unfavorable from the point of view of the respondent, such as being turned down for a promotion. For each outcome, the respondent answered the question "To what extent was the cause controllable by you?" 0 (*not at all*) to 6 (*completely*); $\alpha = .75$.

Control variables. We controlled for smoking behavior and amount of physical exercise in the analyses predicting IgA. Body mass index (height in centimeters/[weight in kilograms]^2) is associated with metabolic rate, which is in turn related to antibody absorption rates. Previous research found that *state* negative affect was related to short-term variation in IgA (Zeier et al., 1996). Because the reuptake in IgA (i.e., its movement out of the central nervous system to become available in excretions) is expected to occur within 45 min (Dienstbier, personal communication, 1996), the state affect questions asked participants to report on their emotions "within the past hour." We measured state negative affect ($\alpha = .83$) using the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) and controlled for it in the analyses relating to IgA. Also, *trait* negative affect is seen as a potential confound variable in the relationships between stressors and health outcomes when these are both measured by self-reports (Brief, Burke, George, Robinson, & Webster, 1988). Thus we controlled for trait negative affect ($\alpha = .87$; also from the PANAS) in the analyses relating to self-reported upper respiratory symptoms.

Results

Table 1 presents the descriptive statistics and correlations for the variables. Confirmatory factor analyses (CFA) using LISREL 8 were conducted to assess the unidimensionality and discriminant validity of the primary independent variables. The relatively small sample size precluded our testing all variables together in a single CFA, so these tests were conducted in a pairwise fashion. Table 2 details the fit indexes for comparisons of conceptually similar constructs. In each case, a model in which both constructs' items were specified to load on the same latent variable (i.e., a "confounded" measurement model) was compared to a CFA, specifying that each instrument's variables loaded independently on a latent variable (i.e., a "congeneric" measurement model). For every comparison, the congeneric model fit the data substantially better than did the confounded model. The two individual difference variables, job self-efficacy and explanatory style (controlla-

Table 1
Means, Standard Deviations, and Correlations Among Study Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Age	36.38	12.10	—														
2. Sex[a]	1.62	0.49	−.13	—													
3. Smoking	0.19	0.39	.04	−.07	—												
4. Exercise	3.02	1.38	−.04	−.09	−.01	—											
5. Body mass index	0.04	0.01	.32	.46	−.05	.02	—										
6. Trait negative affect	1.87	0.68	−.11	.19	.04	−.11	.09	—									
7. State negative affect	1.53	0.56	−.09	.09	.01	−.09	.00	.50	—								
8. Job self-efficacy	5.07	0.76	.14	−.12	.05	.10	−.08	−.38	−.21	—							
9. Explanatory style (controllability)	3.70	0.89	−.05	.00	.13	.10	−.05	−.09	−.02	.02	—						
10. Job control	3.42	0.62	.13	−.09	.06	.11	−.05	−.41	−.26	.25	.31	—					
11. Recent upper respiratory illness	1.10	1.16	−.14	.04	−.03	−.07	−.03	.17	.09	−.02	−.05	−.20	—				
12. Chronic upper respiratory infection	1.14	0.26	−.04	.00	.21	−.03	−.03	.19	.03	−.10	.01	−.10	.28	—			
13. Secretory Immunoglobulin-A	3.14	1.88	−.06	−.05	−.07	.03	−.12	−.02	.07	.03	−.03	−.07	−.01	.01	—		
14. Job complexity	3.80	0.81	.20	.03	−.02	−.02	−.01	−.16	.00	.20	.00	.32	.00	−.09	−.10	—	
15. Responsibility for others	2.75	0.84	.04	−.02	−.06	.08	−.02	−.24	−.10	.24	.12	.44	−.06	−.06	.00	.41	—

Note. $N = 189$ (listwise deletion).
[a] 1 = male; 2 = female.
Critical value of r: $p < .05 = .14$. $p < .01 = .19$. $p < .001 = .23$.

Table 2
Goodness-of-Fit Statistics for Confirmatory Factor Models Testing Discriminant Validity

Instruments	Congeneric model				Confounded model			
	χ^2	*df*	NFI	CFI	χ^2	*df*	NFI	CFI
1. Chronic upper respiratory symptoms, recent upper respiratory illness	140.7	49	.94	0.96	361.0	50	.83	0.85
2. Job control, explanatory style (controllability)	78.3	60	.91	0.98	147.3	61	.86	0.83
3. Job control, job self-efficacy	146.8	98	.87	0.95	342.9	99	.71	0.77
4. Job complexity, responsibility for others	8.4	13	.98	1.00	83.1	14	.82	0.84

Note. The congeneric model specifies variables corresponding to each instrument as measuring separate latent variables. The confounded model specifies variables from both instruments as measuring a single factor. NFI = normed fit index; CFI = comparative fit index.

bility), were uncorrelated and therefore they were not subjected to this test. Thus, the CFA results supported the discriminant validity of the measures.

Table 3 presents the regression results from the tests of Hypotheses 1 and 2. In the hierarchical regression analyses, the control variables were entered first. Smoking was positively related to chronic upper respiratory symptoms only, and negative affect had positive effects on both recent illness and chronic symptoms. None of the control variables significantly predicted IgA. The focal variables of job demands (responsibility for others and job complexity), job control, explanatory style (controllability), and job self-efficacy entered the regression at the second step. The third step entered the job demands-control interaction (Variable 9 in Table 3). The last step of each regression tested the hypothesized three-way interactions.

Omnibus regressions included both explanatory style (controllability) and job self-efficacy and their respective two-way and three-way interactions with job control and each job demand variable (job complexity or responsibility for others). At least one of the three-way interactions was significant in each block tested, and each overall block of three-way interactions was statistically significant for all three dependent variables (see Table 3). Eight of the 12 specific three-way interactions were significant when tested individually (not shown in Table 3).

Hypotheses 1a and 1b concerned the three-way interaction between demands, control, and explanatory style (controllability). The three-way interaction significantly predicted IgA and recent upper respiratory illness. It did not predict chronic symptoms. Hypothesis 1a predicted that job control would not moderate the relationship between job demands and health for individuals with a tendency to blame themselves for negative job outcomes. When we plotted the interactions on spreadsheet, for both IgA and recent illness symptoms, there was an interactive effect between job complexity and control among those persons with high explanatory style (controllability). (When responsibility for others was the stressor variable, no such interaction was observed in this subgroup.) When IgA was the dependent health variable, a slightly positive relationship between both job demands and good health (higher IgA) occurred under low job control. The relationship between job complexity and IgA was negative (indicating poorer coping) under high control (see Figure 1a), but there was no such trend for responsibility for others (see Figure 2a). Thus, the results supported Hypothesis 1a when responsibility for others was the job demand variable. Overall, however, the unexpected interactions between job complexity and control observed among these high controllability participants indicate only partial support for the hypothesis.

Hypothesis 1b predicted a two-way interaction between demands and control among individuals with little tendency to blame themselves for negative job outcomes. It suggested that high job demands would be more strongly related to poor health for individuals with low job control than for those with high job control. The results provided consistent support for this hypothesis. For individuals who had a low self-blaming explanatory style, increased job demands were associated with poor health (i.e., lower IgA and higher upper respiratory illness) among those with low job control (see Figures 1b and 2b for the interactions predicting IgA). There was no relationship between either of the job demands variables and IgA among those reporting high job control. When recent illness was the dependent variable, the two job demands were each related positively to ill health in high control conditions and in low control conditions. However, the trend line for the subgroup with low perceived control was well above the trend line for those with high perceived control. Thus, among persons with lower explanatory style (controllability) (i.e., low self-blaming tendencies), coping seemed to be poorer in the low control subgroup.

Hypotheses 2a and 2b concerned the three-way interaction between job demands, job control, and job self-efficacy. Both measures of job demands interacted with control and self-efficacy to predict chronic and recent upper respiratory infections. No significant interactive effects were found when IgA was dependent. Hypothesis 2a predicted that at low levels of job self-efficacy, high job demands would be more strongly related to poor health for individuals with high job control than for those with low job control. Consistent with this, a positive relationship between each job demand and illness (chronic infection or recent symptoms) was observed under conditions of low self-efficacy and high perceived control. The demands-illness relationship was negative among persons who reported low self-efficacy and low perceived control (see the examples predicting chronic infection; Figures 3a and 4a).

Hypothesis 2b predicted that at high levels of self-efficacy, high job demands would be more strongly related to poor health for individuals with low job control than for those with high job control. Among the participants with high job self-efficacy and low job control, higher responsibility for others was associated with poor health (i.e., chronic upper respiratory infection and recent upper respiratory illness). Conversely, responsibility for others was negatively associated with both chronic infection and

Table 3
Combined Regression Results: Standardized Regression Coefficients

Job demand	Immunoglobulin-A (IgA)		Recent upper respiratory illness		Chronic upper respiratory infection	
	Job complexity	Responsibility for others	Job complexity	Responsibility for others	Job complexity	Responsibility for others
			Step 1			
1. Body mass index	−.11	−.11				
2. Smoking	−.08	−.08	−.05	−.05	.21**	.21**
3. Exercise	.04	.04	−.07	−.07	−.06	−.06
4. Negative affect	.07	.07	.18**	.18**	.18**	.18**
ΔR^2	.02	.02	.04	.04	.08	.08
F	0.87	0.87	3.11*	3.11*	6.29***	6.29***
dfs	(4, 183)	(4, 183)	(3, 209)	(3, 209)	(3, 209)	(3, 209)
			Step 2			
5. Job demand	−.13	.02	.04	.04	−.04	.01
6. Job control	−.02	−.07	−.15†	−.11	−.05	−.06
7. Explanatory style (controllability)	−.03	−.02	.01	−.06	.00	.00
8. Job self-efficacy	.05	.03	.06	.08	−.07	−.08
ΔR^2	.02	.011	.02	.02	.01	.01
F	0.86	0.24	1.02	1.04	0.55	0.48
dfs	(4, 179)	(4, 179)	(4, 205)	(4, 205)	(4, 205)	(4, 205)
			Step 3			
9. 5 × 6	.08	.03	.09	.00	.11	.07
ΔR^2	.01	.00	.01	.00	.01	.01
F	0.90	0.12	1.67	0.00	2.47	1.15
dfs	(1, 178)	(1, 178)	(1, 204)	(1, 204)	(1, 204)	(1, 204)
			Step 4			
10. 5 × 7	.13	.11	−.06	.04	.06	.07
11. 5 × 8	.00	−.06	.06	.00	−.01	−.02
ΔR^2	.01	.02	.01	.00	.00	.01
F	1.35	1.47	0.72	0.00	0.36	0.61
dfs	(2, 176)	(2, 176)	(2, 202)	(2, 202)	(2, 202)	(2, 202)
			Step 5			
12. 6 × 7	.15	.12	.12	.13†	.17*	.15*
13. 6 × 8	−.04	.01	.09	.15†	.00	.02
ΔR^2	.02	.01	.02	.03	.02	.02
F	1.40	0.95	2.15	3.73*	2.48†	2.14
dfs	(2, 174)	(2, 174)	(2, 200)	(2, 200)	(2, 200)	(2, 200)
			Step 6			
14. 5 × 6 × 7	−.25**	−.30***	.14†	.22**	−.03	.10
15. 5 × 6 × 8	.11	.10	.17*	.19*	.24**	.30***
ΔR^2	.04	.05	.03	.05	.03	.05
F	4.18**	4.80**	3.51*	5.33**	3.59*	6.46**
dfs	(2, 172)	(2, 172)	(2, 198)	(2, 198)	(2, 198)	(2, 198)

Note. Each beta coefficient corresponds to the particular step at which the variable initially entered the equation.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

recent illness when job control was higher (see Figure 3b). There was little relationship between job complexity and health among those reporting high control and high job self-efficacy or among those reporting low control and high self-efficacy, although the trend line for low control participants was higher (indicating poorer health) than the trend line for high control participants (see Figure 4b). These results supported Hypothesis 2b. Whereas the negative relationship between job demands and health symptoms was an unexpected finding, it does not counter the general proposition that job control is more salutary for coping purposes when self-efficacy is high.

Discussion

Various organizational interventions, such as job enrichment, empowerment, and worker participation in decision making, have been guided by a basic assumption that the psychological effects of personal control are uniformly favorable across different individ-

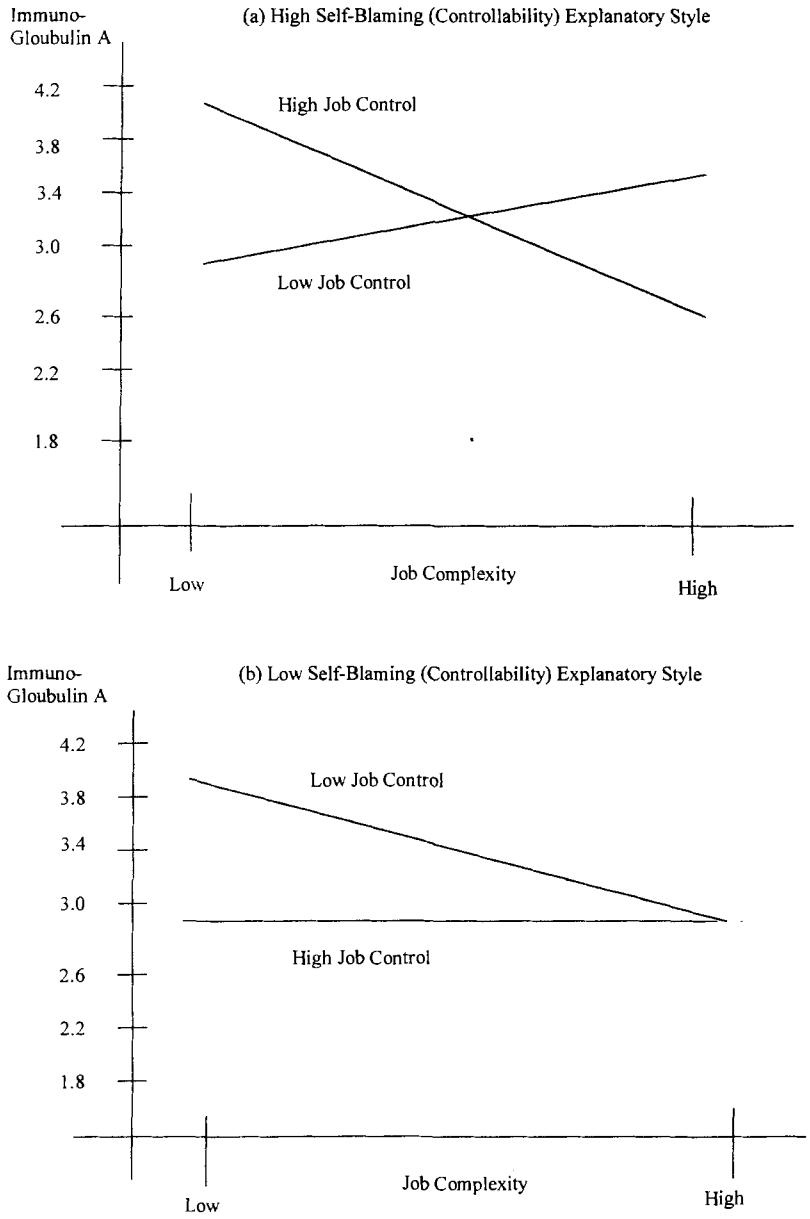

Figure 1. Interaction between job complexity, job control, and explanatory style predicting Immunoglobulin-A, with separate interactions between job control and job complexity plotted for (a) high controllability explanatory style and (b) low controllability explanatory style. Higher Immunoglobulin-A indicates stronger resistance to upper respiratory infection.

uals (Ganster & Fusilier, 1989). The study reported here attempted to examine whether and how the effects of personal control vary across individuals in determining health consequences. Essentially, we sought to determine which individual characteristics are associated with using personal control effectively in stress coping. Based on psychological research on control, stress, and personal agency, we predicted that the disposition to blame oneself for negative outcomes and job self-efficacy are critical individual differences in this respect.

Key Findings

The three-way interaction analyses demonstrated a pattern quite consistent with the predictions derived from psychological research on control and personal agency. The magnitudes of these effects were high considering that the factors that generally make it difficult to detect interactions. Significant interactions have rarely been observed in support of the main prediction of the demands-control model. This study provides an example of how

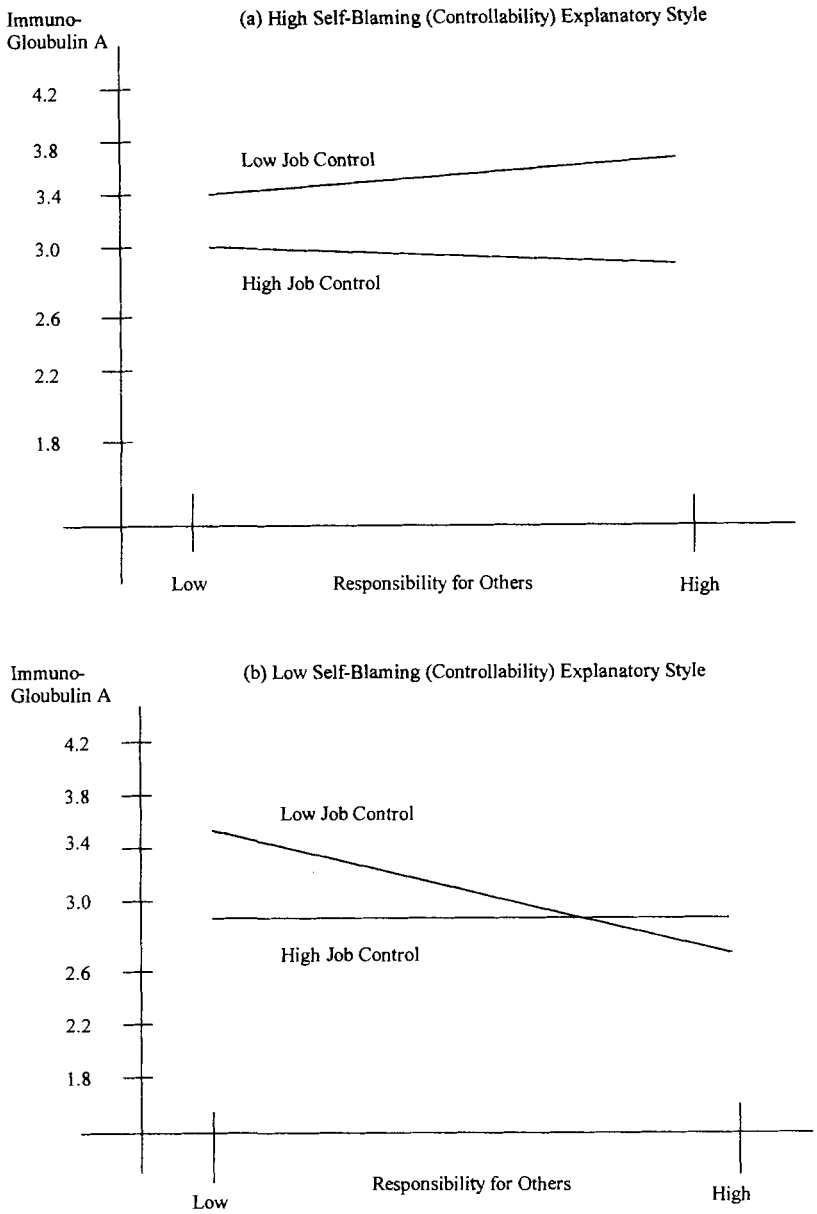

Figure 2. Interaction between responsibility for others, job control, and explanatory style predicting Immunoglobulin-A, with separate interactions between job control and responsibility for others plotted for (a) high controllability explanatory style and (b) low controllability explanatory style. Higher Immunoglobulin-A indicates stronger resistance to upper respiratory infection.

knowledge from the psychological literature can usefully inform organizational researchers seeking to identify individual difference moderators of chronic work conditions on actual health. It also points to areas in which organizations can profitably change self-perceptions of agency so employees respond more favorably to job control.

As hypothesized, self-efficacy affected the patterns of interaction between demands and control. The job demands-control model (Karasek, 1979) was supported in the interactions observed in the subsample of more efficacious respondents. Job demands were positively related to ill health among efficacious workers who perceived little control, and they were either unrelated to ill health or negatively related to ill health among those who perceived much control. Perceiving higher job control had the opposite effect among the more inefficacious respondents. For inefficacious individuals who perceived they had high control, there was a positive relationship between job demands and ill health. This relationship was not found among those who perceived they had little control. Inefficacious persons may find job control debilitating because they cannot utilize it effectively to cope with demands. Rather than being an asset, job control becomes a source of continual frustration and a rationale for self-blame. Efficacious

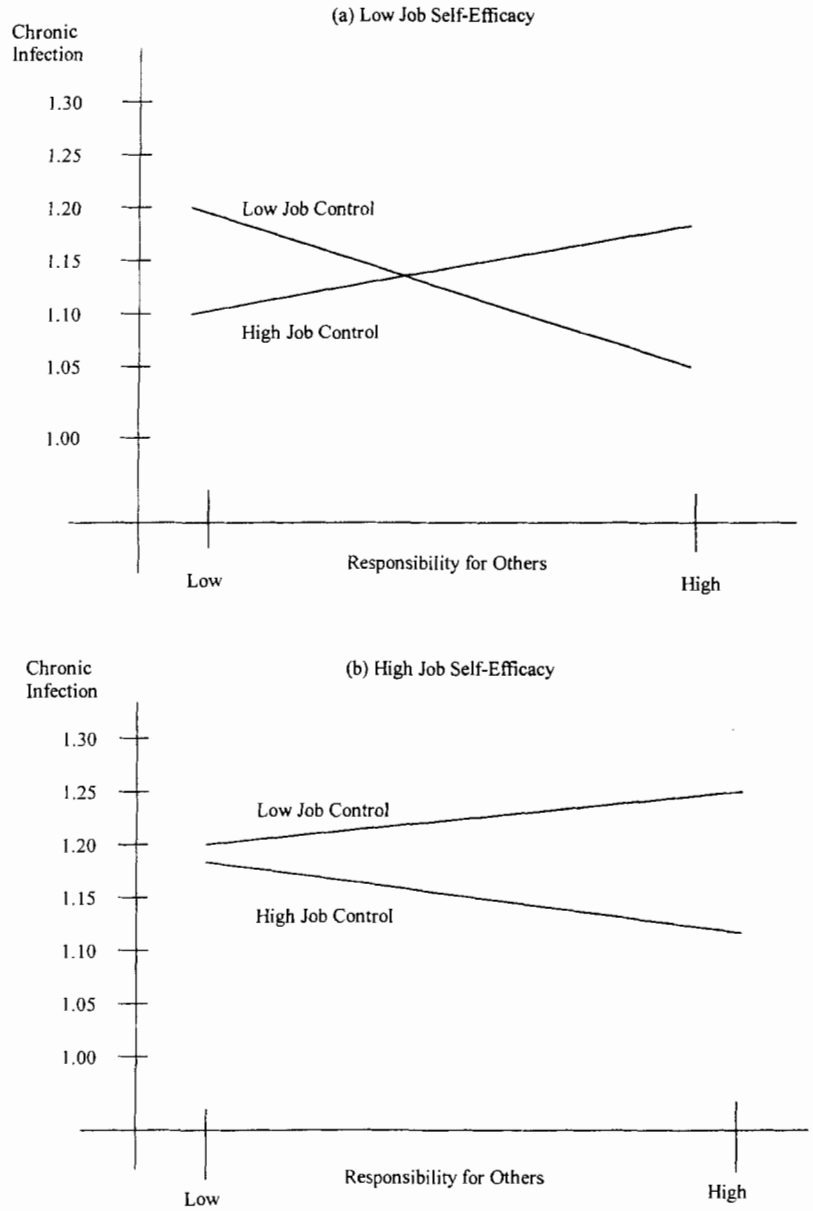

Figure 3. Interaction between responsibility for others, job control, and job self-efficacy predicting chronic upper respiratory infection, with separate interactions between job control and responsibility for others plotted for (a) low job self-efficacy and (b) high job self-efficacy.

workers may be more effective at utilizing job control in their efforts to engage in active coping.

The tests concerning explanatory style (controllability) yielded one unexpected result. Consistent with one prediction of the study, high job control buffered the negative effects of job demands on health among individuals who had low proclivities toward self-blame. Conversely, for both IgA and recent illness symptoms, perceiving lower control seemed to have buffered the effects of job complexity (but not responsibility for others) among the self-blaming individuals. Moreover, high control exacerbated the effects of job complexity on poor health in this subpopulation. It seems possible that the awareness of having little control and high demands may be beneficial for the individuals who have a proclivity for self-blame, because this makes it possible for them to externalize attributions for their difficulties. Schaubroeck and Fink (1998) provided a similar attributional explanation for their interaction findings. They found that persons who had both low social support on the job and low control did not suffer health consequences from high job demands, whereas persons who had either high support or high control reported higher symptoms. It would seem that the presence of one major resource that creates a personal expectation of effective coping may not be sufficient to cope effectively, and dashed coping expectations are a rationale for characterological self-blame. The experience of stress seems to

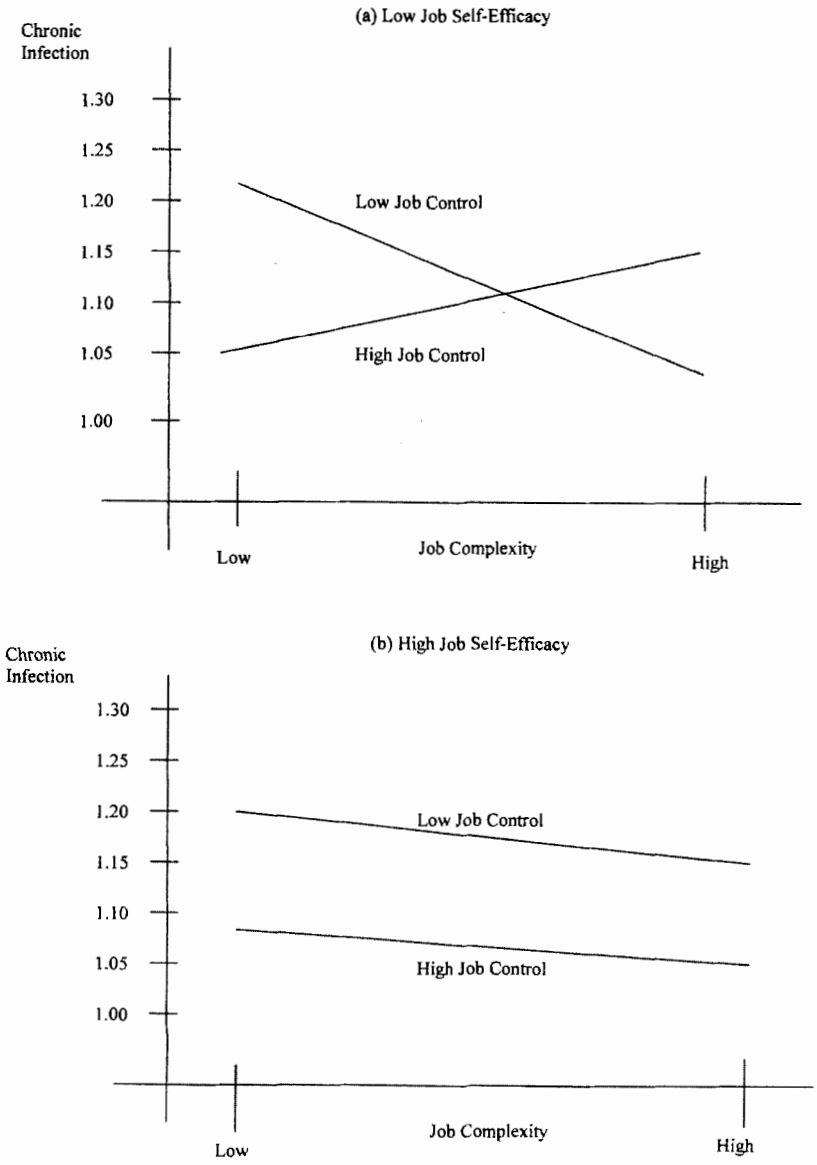

Figure 4. Interaction between job complexity, job control, and job self-efficacy predicting chronic upper respiratory infection, with separate interactions between job control and job complexity plotted for (a) low job self-efficacy and (b) high job self-efficacy.

depend on whether the individual believes he or she should be able to prevent negative outcomes from occurring.

The present findings also extend prior research because they reveal conditions under which work stress is linked to infectious illness and the immune system. Predictions about the effects of chronic psychosocial life stressors on upper respiratory illness have been recently supported in the broader health literature (S. Cohen, 1996). However, we know of no previous studies that linked job stress to illnesses associated with viral or bacterial infections. From an organizational standpoint, variables associated with susceptibility to upper respiratory infection seem to be at least as critical as the outcomes that are typically studied in job stress research.

The results of the three-way interaction analyses indicate that there are different potentialities inherent in job control, both for coping and for enhancing distress. For example, high control was associated with indicators of poor health, such as more chronic infections, higher recent incidence and severity of illness, and lower immune function, among the inefficacious respondents. Researchers in the past have been so intent on showing the motivating and healthful features of job control that its potential negative effects have remained largely uncovered. However, no two-way interactions between job demands and job control approached statistically significant magnitudes in this study. Indeed, this two-way interaction is seldom supported in other research. These results therefore suggest that

individual differences play a key role in the interaction between demands and control.

Limitations and Directions for Future Research

Although all three-way interaction blocks were significant in the omnibus regressions, 4 of the 12 specific three-way interactions tested were not significant. The lack of uniform support for our hypotheses might be partially due to the general difficulties inherent in tests of high-order interactions. Moreover, it is plausible that other individual differences we did not measure (e.g., desire for control) accounted for the discrepancies. As noted by Fox et al. (1993), perceived control seems to be more important for stress coping than is actual control. "Objective" indexes of control perform more poorly in research studies. Even though this study focused on perceived control, it did not explicitly explore individual differences that may determine variation in perceived control. Future studies might therefore profitably investigate personal characteristics that are plausible antecedents of demands and control. In addition, the type of control perceived by the individual may influence the role of individual differences. If the environment is set up in such a way that all persons determine their outcomes (e.g., "easy" task conditions with considerable discretion), then being able to choose behaviors and make decisions (job control) and one's confidence in exercising that discretion (job self-efficacy) will be strongly related. Such circumstances might be referred to as conditions of high actual (or effective) control, and this is quite different from the way "objective" indexes of control are conceived. If future research can develop and utilize means of measuring actual control, then the role of individual differences within the processes examined here may be much less apparent. Similarly, to the extent that self-blame for aversive outcomes that occur at work could be explained by traits alone, then situational differences (e.g., job control) would seem to be less important for coping. In this study, we examined two major dispositions associated with self-blame, explanatory style and trait negative affect. Perhaps other dispositions may have stronger main effects on characterological self-blame that would overwhelm the subtrends associated with the situational differences we observed in this study.

The pattern of interaction findings for IgA essentially mirrored those obtained for upper respiratory infection (although in opposite directions, because higher IgA scores indicate better immune function). IgA is involved in the etiology of some upper respiratory infections, and thus it might mediate the relationship between stressors and symptoms of upper respiratory illness (S. Cohen, 1996). Whereas IgA correlated significantly with the duration of the most severe upper respiratory illnesses among those respondents who had had an episode within the previous three months ($r = -.26$, $p < .05$), it was unrelated to the frequency of occurrence of such illness. The correlations between IgA and the composite indexes were $-.01$ and .01 for recent upper respiratory illness and chronic upper respiratory infection, respectively. IgA is only one of many factors that determine how successfully the body fends off attacks from invading antigens. In addition, the relationship between infection by an antigen and observable symptoms is affected by histamines and other biochemical factors. A direct test of the mediating effects of IgA within the relationship between work stress and illness would require that the researcher deliberately expose study participants to stress and an antigen that IgA is known to impede. There are obvious practical barriers precluding such invasive and potentially dangerous studies in the workplace. Thus, rather than testing a mediational model of stress, immunity, and disease, we were limited to testing IgA and illness symptoms as separate indicators of susceptibility to infectious disease.

Causal inferences are also limited by using measures obtained at a single period in time. Whereas IgA is more stable than are other physiological measures, such as stress hormones (e.g., cortisol, catecholamines; Henningsen et al., 1992), a more reliable assessment of immune function (and thus possibly a stronger relationship with health outcomes) is obtained by sampling participants at different times and in different situations (e.g., at home and at work). Overall, the cross-sectional nature of the data requires our interpretations of causality to be based on (a) theoretical grounds and (b) complex patterns of interaction and covariation. We are less concerned about issues of common method variance for three reasons. First, our measure of the immune system was independent of the respondents' perceptions, but the results from this measure largely paralleled those pertaining to the self-reported outcomes. Second, it seems unlikely that the complex three-way interaction patterns that we predicted and then observed could reflect any available response sets among the respondents. Third, as controlling for trait negative affect has been found to attenuate observed relationships among self-reported stressors and health (e.g., Brief et al., 1988), we controlled for trait negative affect in our analyses of self-reported data. The present study could be improved on, however, by examining an array of infectious illnesses and immune variables. Moreover, examining the health consequences over time with a prospective research design could permit stronger causal inferences. Future research could also improve on the present one by testing a broader based population.

Conclusions

This study suggests that the negative characterization of job demands can be extended to the domain of infectious disease. Organizations should be more concerned about job stress if it contributes to the incidence, severity, and duration of infectious disease. However, the effects of demands on health are complex and vary considerably according to individual differences. Whereas increasing job control has been advocated as a simple remedy for reducing the negative health consequence of job demands, our research supports the view that increasing control can be harmful for individuals who lack the capacity to use it. It seems clear from this research and that of Schaubroeck and Merritt (1997) that having more self-efficacy on the job is generally better than having less, not just from a performance perspective (as much previous research has indicated) but also from the point of view of managing stress. We have extended their findings, which were based on predictions of blood pressure, to the prediction of immune function and upper respiratory illness. To our knowledge, this is the first study linking job stress and job control to illnesses associated with viral or bacterial infections. Viral illnesses propagate throughout a work unit via casual modes of transmission and diminish productivity by reducing productive work hours. Thus, even if better coping with job stress produces only small reductions in the incidence, duration, or severity of such illnesses, a

much-reduced problem of infectious disease contagion may be achieved.

In addition, this study suggests that explanatory style (controllability) is a separate factor determining how workers respond to job control in stressful situations. Low explanatory style (controllability) does not reflect a tendency to blame the environment for all of one's failures. Rather, such persons often have an informational orientation, judging their personal culpability based on assessments of the situation and their own behavior. Seligman (1990) has described how workers can be trained to follow this pattern and make their explanations for bad events more realistic using cognitive therapeutic approaches. Realistic appraisals legitimately lead one to the occasional conclusion that one is personally and solely culpable for some negative outcome, but a proper causal perspective recognizes that one's negative outcomes are very often caused by external factors or by internal factors that are not characterological. Thus, a person who has a realistic perspective about his or her personal responsibility for negative outcomes does not become discouraged by a condition of learned helplessness from acting to remedy the causes of an outcome. Training efforts focused on self-management training or mastery modeling (cf. Eden & Kinnar, 1991; Gist & Mitchell, 1992; Wood & Bandura, 1989) and supportive supervisory practices, such as providing contingent positive feedback, promote both higher job self-efficacy and more realistic appraisals of personal causation in negative outcomes. Because optimistic, efficacious self-construals also have positive performance benefits, encouraging more realistic causal reasoning about negative events and high job self-efficacy should benefit both the individual and the organization in numerous ways.

These findings should also be considered by organizations that are deliberately seeking to increase levels of worker control either because that is necessitated by a reorganization or it is simply being pursued as a means to enrich jobs and enhance employee well-being. Objective changes in control do not always correspond to changes in perceived control, and perceived control seems to be the operative variable in coping (Fox et al., 1993; Ganster & Fusilier, 1989). Successfully increasing workers' perceived control is not possible without simultaneously attending to the intervening perceptual process. The organization can provide a worker with objectively more choices, but whether this provides more actual control depends on the worker. Changes that provide a salutary increase in initiative for one worker may be seen as psychologically threatening by another. Thus, to increase actual control, organizations must enhance control options *and* promote effective worker beliefs about personal agency. In this way, control-focused interventions, such as employee empowerment, job enrichment, and participation in decision making, are more likely to have desirable outcomes for worker well-being.

References

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87,* 49–74.

Averill, J. R. (1973). Personal control over aversive stimuli and its relationship to stress. *Psychological Bulletin, 80,* 286–303.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: W. H. Freeman.

Brief, A. P., Burke, M. J., George, J. M., Robinson, B. S., & Webster, J. (1988). Should negative affectivity remain an unmeasured variable in the study of job stress? *Journal of Applied Psychology, 73,* 193–198.

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

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

Cohen, G., & Java, R. (1994). Memory for medical history: Accuracy of recall. *Applied Cognitive Psychology, 9,* 273–288.

Cohen, S. (1996). Psychological stress, immunocompetence, and upper respiratory infections. *Current Directions in Psychological Science, 5,* 86–90.

Cohen, S., Tyrrell, D. A. J., & Smith, A. P. (1993). Negative life events, perceived stress, negative affect and susceptibility to the common cold. *Journal of Personality and Social Psychology, 64,* 131–140.

DeFrank, R. S., & Ivancevich, J. M. (1998). Stress on the job: An executive update. *Academy of Management Executives, 12,* 55–66.

Eden, D., & Kinnar, J. (1991). Modeling Galatea: Boosting self-efficacy to increase volunteering. *Journal of Applied Psychology, 76,* 770–780.

Endresen, I. M., Ellertsen, B., Endresen, C., Hjelman, A. M., Matre, R., & Ursin, H. (1991). Stress at work and psychological and immunological parameters in a group of Norwegian female bank employees. *Work & Stress, 5,* 217–227.

Fisher, S. (1984). *Stress and the perception of control.* Hillsdale, NJ: Erlbaum.

Fox, M. L., Dwyer, J., & Ganster, D. C. (1993). Effects of stressful job demands and control on physiological and attitudinal outcomes in a hospital setting. *Academy of Management Journal, 36,* 289–318.

Furnham, A., Sadka, V., & Brewin, C. R. (1992). The development of an occupational attributional style questionnaire. *Journal of Organizational Behavior, 13,* 27–39.

Ganster, D. C., & Fusilier, M. R. (1989). Control in the workplace. In C. L. Cooper & I. Robertson (Eds.), *International Review of Industrial and Organizational Psychology* (pp. 235–280). London: Wiley.

Gardner, D. G., & Pierce, J. L. (1998). Self-esteem and self-efficacy within the organizational context. *Group & Organization Management, 23,* 48–70.

Gist, M. E., & Mitchell, T. R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. *Academy of Management Review, 17,* 183–211.

Golin, S., Sweeney, P. D., & Schaeffer, D. E. (1981). The causality of causal attributions in depression: A cross-lagged panel correlational analysis. *Journal of Abnormal Psychology, 90,* 14–22.

Gwaltney, J. M., Jr. (1995). The common cold. In G. L. Mandell, J. E. Bennett, and R. Dolin (Eds.), *Mandell, Douglas, and Bennett's principles and practice of infectious disease* (4th ed., pp. 561–566). New York: Churchill-Livingstone.

Henningsen, G. M., Hurrell, J. J., Jr., Baker, F., Douglas, C., MacKenzie, B. A., Robertson, S. K., & Phipps, F. C. (1992). Measurement of salivary immunoglobulin A as an immunologic biomarker of job stress. *Scandinavian Journal of Work, Environment, and Health, 18* (Suppl. 2), pp. 133–136.

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

House, J. S., Strecher, V., Metzner, H. L., & Robbins, C. A. (1986). Occupational stress and health in men and women in the Tecumseh Community Health Study. *Journal of Health and Social Behavior, 27,* 62–77.

Johns, G., & Xie, J. L. (1998). Perceptions of absence from work: People's Republic of China versus Canada. *Journal of Applied Psychology, 83,* 515–530.

Kalleberg, A. L., Knoke, D., Marsden, P. V., & Spaeth, J. L. (1996). *Organizations in America: Analyzing their structures and human resource practices.* Thousand Oaks, CA: Sage.

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24,* 285–309.

Landsbergis, P. A., Schnall, P. L., Warren, K., Pickering, T. G., & Schwartz, J. E. (1994). Association between ambulatory blood pressure and alternative formulations of job strain. *Scandinavian Journal of Work, Environment, and Health, 20,* 349–363.

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

MacIntyre, S., & Pritchard, C. (1989). Comparison between self-assessed and observer-assessed presence and severity of colds. *Social Science & Medicine, 29,* 1243–1248.

Miller, C. C., Cardinal, L. B., & Glick, W. H. (1997). Retrospective reports in organizational research: A reexamination of recent evidence. *Academy of Management Journal, 40,* 189–204.

Morris, L. (1995). *Managing the evolving corporation.* New York: Van Nostrand Reinhold.

Ohman, A., & Bohlin, G. (1989). The role of controllability in cardiovascular activation and cardiovascular disease: Help or hindrance? In A. Steptoe & A. Appels (Eds.), *Stress, personal control and health* (pp. 257–276). Brussels, Belgium: Wiley.

Reynolds, J. R. (1997). The effects of industrial employment conditions on job-related distress. *Journal of Health and Social Behavior, 38,* 105–116.

Riggs, M. L., Warka, J., Babasa, B., Betancourt, R., & Hooker, S. (1994). Development and validation of self-efficacy and outcome expectancy scales for job-related applications. *Educational and Psychological Measurement, 54,* 793–802.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80,* 1–28.

Schaubroeck, J., & Fink, L. S. (1998). Facilitating and inhibiting effects of job control and social support on stress outcomes and role behavior: A contingency model. *Journal of Organizational Behavior, 19,* 167–195.

Schaubroeck, J., & Merritt, D. E. (1997). Divergent effects of job control on coping with work stressors: The key role of self-efficacy. *Academy of Management Journal, 40,* 738–754.

Schwoerer, C. E., & May, D. R. (1996). Age and work outcomes: The moderating effects of self-efficacy and tool design effectiveness. *Journal of Organizational Behavior, 17,* 469–487.

Seligman, M. E. P. (1990). *Learned optimism.* New York: Pocket Books.

Smith, C. S., Tisak, J., Hahn, S. E., & Schmeider, R. A. (1997). The measurement of job control. *Journal of Organizational Behavior, 18,* 225–237.

Speier, C., & Frese, M. (1997). Generalized self-efficacy as a mediator and moderator between control and complexity at work and personal initiative: A longitudinal field study in East Germany. *Human Performance, 10,* 171–192.

Turner-Cobb, J. M., & Steptoe, A. (1996). Psychosocial stress and susceptibility to upper respiratory tract illness in an adult population sample. *Psychosomatic Medicine, 58,* 404–412.

Wall, T. D., Jackson, P. R., Mullarkey, S., & Parker, S. (1996). The demands-control model of job strain: A more specific test. *Journal of Occupational and Organizational Psychology, 69,* 153–166.

Ware, J. E., Johnston, S. A., Davies-Avery, A., & Brook, R. H. (1979). *Conceptualization and measurement of health for adults in the health insurance industry study.* Santa Monica, CA: Rand Corp.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54,* 1063–1070.

Wood, R., & Bandura, A. (1989). Impact of conceptions of ability on self-regulatory mechanisms and complex decision making. *Journal of Personality and Social Psychology, 56,* 407–415.

Xie, J. L., & Johns, G. (1995). Job scope and stress: Can job scope be too high? *Academy of Management Journal, 38,* 1288–1309.

Zeier, H., Brauchli, P., & Joller-Jemelka, H. I. (1996). Effects of work demands on immunoglobulin A and cortisol in air traffic controllers. *Biological Psychology, 42,* 413–423.

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