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## Qualities of Work Environments That Promote Perceived Support for Creativity

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*ABSTRACT: This article examines physical and social predictors of perceived support for creativity in the workplace and their effects on important personal and organizational outcomes. Recent conceptualizations of creativity suggest that the physical environment plays a key role in facilitating the development of creative processes and products, yet prior studies have given little attention to demonstrating empirical links between physical and social features of the workplace and employees' subjective experiences of creativity. This study examined employees' perceptions of support for creativity at work as a possible mediator of the relationships between objective measures of distracting stimuli and subjective appraisals of social climate, on the one hand, and self-reported levels of job satisfaction and personal stress, on the other. Results indicated that both recorded levels of environmental distraction and self-reports of social climate are significantly linked to employees' perceptions of support for creativity at work. Moreover, employees' appraisals of support for creativity at work mediate the relationships between their perceptions of social climate and self-reported job satisfaction, social climate and stress, and between environmental distraction and job satisfaction.*

For this article we examined both physical and social environmental predictors of perceived support for creativity in the workplace and their effect on important personal and organizational outcomes. Earlier research has conceptualized creativity as a personal disposition or trait (e.g., Barron & Harrington, 1981; Guilford, 1959; Maslow, 1959), as an intellectual or artistic product that is judged by observers to be both novel and useful (e.g., Albert, 1983; Eysenck, 1994; Ford, 1996; Glynn, 1996; Rogers, 1959), or as a

dynamic process involving individuals' transactions with their social environment (Amabile, 1983; Lasswell, 1959; Mead, 1959; Mumford & Gustafson, 1988; Sternberg & Lubart, 1996). Recent conceptualizations of creativity have suggested that the physical environment plays an important role in facilitating the development of creative processes and products (Amabile, 1988), but little empirical attention has been given to the ways the physical environment affects individuals' perceptions and experiences of creativity. An exception to this trend is a study by Clitheroe (2000), in which architects evaluated the ways the physical and social features of their work environments influenced their capacity to produce creative architectural designs.

Through this research we extended earlier studies of creativity by examining the links between physical and social qualities of work environments and employees' perceptions of the extent to which their own creativity is supported by the workplace. Moreover, we explored the relationships between workers' experiences of support for creativity at work and their overall job satisfaction and well-being. Specifically, workers' perception of support for creativity at work was viewed as a possible mediator of the relationships between objectively measured levels of distracting stimuli and subjective appraisals of social climate, and

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self-reported outcome measures pertaining to job satisfaction and personal stress.

It is important to distinguish the aims of this research from those of earlier studies that assessed the effects of supportive supervisory and social climates on employees' creative performance at work. In those studies, creative performance was measured either by workers' self-reports of their innovative contributions on the job (Bunce & West, 1995) or through supervisory ratings of employee creativity (Oldham & Cummings, 1996). Because of our interest in the relationships between perceived support for creativity at work and employee well-being, we focused on workers' subjective experience of creativity at work, rather than on their self-reports or others' ratings of their job performance. Also, whereas many studies of creativity and innovation have examined personality traits as predictors of creative job performance (cf. Bunce & West, 1995; West & Farr, 1990), we chose to focus instead on other issues that have been given relatively less attention in prior research—namely, the links among physical and social environmental features of the workplace, employees' subjective experiences of creativity, and their self-reported levels of job satisfaction and stress.

Our conceptualization of the links among work environments, employees' perceptions of support for creativity, and their overall well-being was based on two key assumptions. First, we assumed that the physical and social features of work environments influence employees' job satisfaction and well-being (Levi, 1992; Moos, 1986; Stokols, 1992). Earlier studies have documented the distracting, stress-inducing qualities of unpredictable or uncontrollable physical stimuli and events such as noise or prolonged exposure to crowded environments (Cohen, Evans, Stokols, & Krantz 1986; Glass & Singer, 1972; Sherrod, 1974). Others have demonstrated the influence of social climate and social support on individuals' physical and emotional well-being across a variety of settings (Berkman & Syme, 1979; Cohen & Syme, 1985; Holahan & Moos, 1990; Moos, 1979). To our knowledge, no earlier studies have examined the influence of physical features of work environments on employees' well-being and job satisfaction, as mediated by their perceptions of support for creativity at work. A recent study by Runco (1995), however, did examine the relationship between the job satisfaction of artists employed by a large organization and their appraisals

of the Climate for Creative Productivity (CCPI) at work and found a significant positive relationship between the CCPI index (cf. Witt & Boerkem, 1989) and job satisfaction levels.

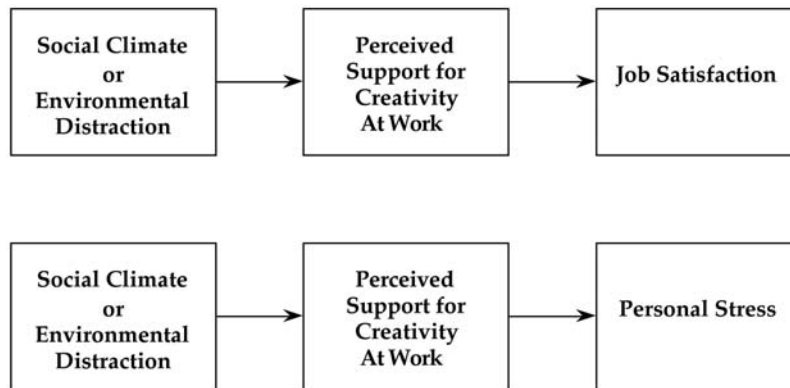
Second, we hypothesized that environmental distractions and poor social climate at work can restrict employees' experiences of creativity by interfering with their concentration on job-related tasks or by heightening feelings of unpredictability and uncontrollability, thereby fostering the belief that the workplace does not support their efforts to be creative. Employees' perception that the work environment discourages creativity, in turn, was expected to increase their vulnerability to job dissatisfaction and stress. These hypothesized links among the major predictor, mediator, and outcome variables in this study are shown in Figure 1.

## Methods

### Participants

A total of 97 full-time supervisory and staff-level employees participated in this study. These individuals participated in a study of workers' subjective experiences of creativity at work, as part of the University of California (UCI) Facilities Survey conducted during 1986 and 1987. The survey examined the reactions of campus-based and nonuniversity workers to relocations and renovations of their offices. More than 250 individuals participated in the survey. A subset of 97 respondents, drawn from four campus-based departments and one nonuniversity company, was identified for inclusion in the analyses. These individuals completed a creativity questionnaire that was administered only once, during the third and final phase of the study. Those individuals who participated only during the first or second phase of the survey, thus, were, not eligible for inclusion in this analyses of workers' creativity experiences.

The 97 participants included 21% men and 79% women. Of these, 34% were nonsupervisory support staff, 36% were supervisory support staff or entry-level professional staff, and 30% were supervisory professional staff. Approximately 85% of the participants were White and 15% non-White. Approximately 74% of the participants were drawn from the four administrative units at UCI, and 26% were employed by a local private environmental and transportation planning firm.



**Figure 1.** Effects of social climate and environmental distraction on job satisfaction and stress mediated by perceived support for creativity at work.

### Procedures

Questionnaires assessing employees' perceptions of support for creativity, job satisfaction, personal stress, and their ratings of physical and social features of the workplace were administered during regular work hours. Objective recordings of environmental conditions were gathered at each of the participating worksites by the research team. These measures included the physical dimensions of each participant's work area (e.g., square footage and levels of enclosure), onsite observations of pedestrian traffic and noise sources adjacent to each employee's work area, and diagrams summarizing the visual exposure of each employee's immediate work area to other individuals. Recordings of employees' blood pressure and heart rate also were gathered by the research team.

Surveys were administered at three times to work groups that experienced extensive office renovations or relocations, and comparison groups that experienced neither. Questionnaires included categorical and continuous scaled responses, as well as open-ended items. Detailed descriptions of all questionnaires included in the facilities survey are provided in earlier reports focusing on the links between job conditions and health rather than on the creativity-related findings reported here for the 97 participants who completed the Creativity Questionnaire at Time 3 (cf. Stokols, Churchman, Scharf, & Wright, 1990; Stokols & Scharf, 1990). Objective measures of physical and social conditions in the workplace were recorded by the research team at the same time as questionnaires were administered to employees. Partici-

pation in the facilities survey was voluntary, and confidentiality was maintained throughout the project.

### Measures and Analyses

The major hypotheses of the study were assessed through a series of regression analyses in which covariates were entered at Step 1 and the predictor variables or mediator variables were entered at Step 2. Outcome variables included two self-report measures described as follows.

**Covariates.** The following covariates (included in the study's Demographic Information Questionnaire) were entered at Step 1 of all regression analyses to control for individual differences on these dimensions: age, education, and job status. The job status variable was produced by combining two categorical variables: job level (support or professional) and responsibilities (supervisory or nonsupervisory), to form a three-level ordinal variable: (a) nonsupervisory support staff (lowest), (b) supervisory support staff and nonsupervisory professional staff (middle), and (c) supervisory professional staff (highest).

An additional covariate, personal importance of creativity, was entered in the regression analyses after age, education, and job status, to control for differences among workers in the importance they assigned to being creative, and for the effects of those differences on the outcome measures. This covariate was

formed by averaging two 7-point Likert items pertaining to the importance of being creative at work and at home (included in the values and experiences associated with Creativity Questionnaire). The two measures were combined into a single scale to provide a general index of perceived importance of creativity across multiple life domains (i.e., home and work) because we assumed that individuals manifest this dispositional tendency across both domains.

**Predictor Variables.** It was hypothesized that employees' subjective appraisals of social climate at work, as well as objective measures of environmental distraction in the workplace, would predict levels of job satisfaction and stress reported by the participants. A subjective measure of social climate at work was derived from eight 4-point Likert-scale items included in the study's checklist of work-related experiences. Individual items probed positive or negative feelings about assigned tasks, physical health symptoms associated with these tasks and the use of certain equipment, and supportive or nonsupportive communication among employees and supervisors. The eight items pertaining to the quality of employees' social relations with their coworkers and supervisors were averaged to yield a summary measure of social climate.

An objective index of environmental distraction at work was derived from onsite recordings of environmental conditions including levels of noise and foot traffic within (and adjacent to) each employee's work station; and the visual exposure (or privacy) of the work station. Ambient noise levels were computed as the mean of all high-decibel readings recorded in and adjacent to an employee's work area over a 5-min interval.<sup>1</sup> The number of people seen walking through

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<sup>1</sup>Noise recordings were obtained in two ways. First, measurements were taken with a Simpson 886 hand-held sound-level meter that records noise amplitude for one moment at a particular location. These recordings were taken over a 5-min interval at each employee's work station. For each measurement period, the high, low, and average sound levels were calculated. Specific noise sources such as printers without hoods, collating machines, and photocopiers also were monitored. Second, a noise level analyzer (Bruel and Kjaer Type 4426) was used to assess noise levels within an office over a 4-hr period. This method provided information about average daily noise exposures for employees working in particular areas of an office. The principal source of noise data for the analyses reported in this article were the sound-level measures obtained using the hand-held dosimeter.

or near that person's work area during the noise-measurement period was recorded by members of the research team and used as an index of pedestrian traffic. Visual exposure levels at each work station also were assessed in terms of the number of coworkers who, from their own work stations, could potentially see an employee seated at his or her desk. Standardized scores for visual exposure, noise level, and foot traffic were combined to form the overall index of environmental distraction.

**Outcome Variables.** The checklist of work-related experiences included nine 5-point Likert items that probed employees' levels of emotional stress during the month preceding their completion of the questionnaire (cf. Cohen, Kamarck, & Mermelstein, 1983). These items, 1 (*never*) and 5 (*very often*) were averaged to yield an overall self-report index of personal stress. An additional item, "How satisfied are you with your current job?" was used as an index of job satisfaction, 1 (*not at all satisfied*) and 5 (*very satisfied*).

**Mediator Variable.** It was hypothesized that employees' perception of support for creativity at work would mediate the relationships between the predictor and outcome variables. An index of perceived support for creativity at work was formed by averaging three 7-point Likert scales pertaining to the availability of creative outlets at work, 1 (*not at all available*) and 7 (*very available*), how often respondents felt creative at work, 1 (*never*) and 7 (*very often*), and the extent to which their work environment encouraged or discouraged their creativity, 1 (*strongly discouraged*) and 7 (*strongly encouraged*).

## Data Analyses

Research questions were assessed using the multiple regression procedures of the SPSSX-PC computer program. Data analyses followed procedures to test for mediating relationships described by Baron and Kenny (1986). This method calls for a series of three regression analyses.

The first analysis regresses a mediator (perceived support for creativity at work) on an independent

variable (social climate or environmental distraction). Mediation criteria require that the independent variables significantly affect the mediator. The second analysis regresses the dependent variables (personal stress or job satisfaction) on the independent variables (social climate or environmental distraction). Mediation criteria require that independent variables significantly affect dependent variables. The third analysis regresses the dependent variables (personal stress or job satisfaction) on both the independent variables (social climate or environmental distraction) and the mediator variable (perceived support for creativity at work). Mediation criteria require that (a) the mediator variable significantly affects the dependent variable, and (b) the effect of the independent variable on the dependent variable is reduced in the third analysis, as compared with its effect on the dependent variable in the second analysis (where the mediator variable has not been entered into the regression equation).

The mediation analyses were performed separately for each pair of independent and dependent variables. In all of these analyses, the covariates—age, education, job status, and personal importance of creativity—were entered in the regression equations before the predictor and mediating variables.

## Results

### Internal Consistency of Scaled Variables

As a check on the internal consistency of the scaled variables analyzed in this study, Cronbach's alpha was computed for all multi-item scales. A summary of the major scales and their interitem reliabilities is provided in Table 1. Cronbach's alpha reliability coefficients were as follows: perceived support for creativity at work = .84; importance of creativity = .71; social climate = .71; and personal stress = .88.

**Table 1.** Summary of Major Variables and Interitem Reliability Data

Scale Description	Scale Items	$\alpha$
Perceived Support for Creativity at Work	How available to you are creative outlets at work?	.84
Importance of Creativity	How often do you feel creative at work?	.71
	To what extent is your creativity encouraged or discouraged at work?	
	How important is it for you to be creative at work?	
Social Climate	How important is it for you to be creative at home?	.71
	Open exchange of ideas with my supervisor	
Environmental Distraction	Supportive interactions with coworkers	N/A
	High employee morale	
	Participate in decisions about projects I work on	
	Participate in decisions that affect my work environment	
	Conflict with coworkers on project priorities <sup>a</sup>	
	Insufficient guidance from supervisor <sup>a</sup>	
	Difficulties in contacting supervisor <sup>a</sup>	
Personal Stress	Sum of people viewed while seated, number of people who can see while seated, foot traffic, and noise levels	.88
	Unable to control the important things in your life <sup>a</sup>	
	Confident about ability to handle personal problems	
	Things were going your way	
	Difficulties piling up so high you can't overcome them <sup>a</sup>	
	You could not cope with all the things you had to do <sup>a</sup>	
	You were on top of things	
	Nervous and stressed <sup>a</sup>	
Downhearted and blue <sup>a</sup>		
Job Satisfaction	Satisfied with life	N/A
	How satisfied are you with your current job?	

<sup>a</sup>Designated items are reverse scored.



**Mediation of Environmental Effects on Job Satisfaction and Personal Stress × Employees' Perception of Support for Creativity at Work**

As shown in Tables 2 and 3, both independent variables (social climate and environmental distraction) meet the first criterion identified by Baron and Kenny (1986) for mediation analyses (i.e., they significantly affect the mediator variable). After accounting for the effects of the covariates, the standardized regression coefficients indicate that both variables significantly predict perceived support for creativity at work. A more positive social climate was associated with greater perceived support for creativity at work ( $\beta = .36$ ,  $R^2$  change = .13,  $p < .0003$ ). Higher levels of environmental distraction at work were associated with less perceived support for creativity ( $\beta = -.35$ ,  $R^2$  change = .11,  $p < .004$ ).

In the analyses incorporating personal stress as the dependent variable, the criteria for statistical mediation were met only when social climate was entered as the independent variable (but not with environmental distraction as the independent variable). As shown in Table 4, the second mediational analysis indicated that a more positive social climate was associated with lower levels of personal stress ( $\beta = .26$ ,  $R^2$  change = .07,  $p < .02$ ). In the third mediation analysis, perceived support for creativity at work (the mediator) was a statistically significant predictor of personal stress ( $\beta = .39$ ,  $R^2$  change = .12,  $p < .002$ ). Perceived support for creativity was negatively associated with personal stress. (The beta coefficient was positive because higher scores on the personal stress scale indicate lower levels of stress). In addition, the effect of the independent variable, social climate, on personal stress was less in the third mediation analysis ( $\beta = .13$ ) than in the second analysis ( $\beta = .26$ ). In fact, the effect of social climate on personal stress was no longer statistically significant in the third analysis.

In the analyses incorporating job satisfaction as the dependent variable, the criteria for statistical mediation were met when either social climate or environmental distraction was entered as the independent variable. As shown in Table 5, the second

**Table 2.** Effect of Social Climate on Perceived Support for Creativity at Work<sup>a</sup>

Variable	B on Entry	Se B	R <sup>2</sup> Change	p
Age	-.06	.13		.55
Education	-.19	.19		.08
Job Status	.24	.20		.03
Importance of Creativity	.31	.34		.005
Social Climate	.36	.30	.13	.0003

Note: Final equation adjusted  $R^2 = .27$ ,  $F(5,76) = 7.28$ ,  $p = .0000$ . <sup>a</sup>This equation constitutes the first analysis in Baron & Kenny's (1986) test for statistical mediation. The first criterion of mediation is met, in that the predictor variable, social climate, significantly affects the mediator variable, perceived support for creativity at work.

**Table 3.** Effect of Environmental Distraction on Perceived Support for Creativity at Work<sup>a</sup>

Variable	B on Entry	Se B	R <sup>2</sup> Change	p
Age	-.03	.15		.78
Education	-.09	.21		.45
Job Status	.15	.23		.22
Importance of Creativity	.23	.38		.06
Environmental Distraction	-.35	.02	.11	.004

Note: Final equation adjusted  $R^2 = .15$ ,  $F(5,67) = 3.46$ ,  $p = .0076$ . <sup>a</sup>This equation constitutes the first analysis in Baron & Kenny's (1986) test for statistical mediation. The first criterion of mediation is met, in that the predictor variable, environmental distraction, significantly affects the mediator variable, perceived support for creativity at work.

**Table 4.** Effect of Social Climate on Personal Stress as Mediated by Perceived Support for Creativity at Work

Variable	B on Entry	Se B	R <sup>2</sup> Change	p
Mediation Analysis 2				
Age	.15	.07		.23
Education	.01	.10		.94
Job Status	.01	.11		.93
Importance of Creativity	-.09	.18		.47
Social Climate	.26	.18	.07	.02
Mediation Analysis 3				
Perceived Support for Creativity at Work				
Social Climate	.39	.06	.12	.002
Social Climate	.13	.19	.01	.29

Note: Analysis 2 final equation adjusted  $R^2 = .04$ ,  $F(5,71) = 1.69$ ,  $p = .1470$ . Analysis 3 final equation adjusted  $R^2 = .10$ ,  $F(6,70) = 2.45$ ,  $p = .0328$ .

mediation analysis indicated that a more positive social climate was associated with greater job satisfaction ( $\beta = .52$ ,  $R^2$  change = .27,  $p < .0000$ ). In the third mediation analysis, perceived support for creativity at work (the mediator) was a statistically significant predictor of job satisfaction. Perceived support for creativity was positively associated with job satisfaction ( $\beta = .46$ ,  $R^2$  change = .19,  $p < .0001$ ). In addition, the effect of the independent variable, social climate, was less in the third mediation analysis ( $\beta = .42$ ) than in the second analysis ( $\beta = .52$ ). The effect of social climate on job satisfaction, however, remained statistically significant in the third analysis.

As shown in Table 6, the second mediation analysis indicated that higher levels of environmental dis-

traction were associated with lower levels of job satisfaction ( $\beta = -.28$ ,  $R^2$  change = .07,  $p < .0246$ ). In the third mediation analysis, perceived support for creativity at work (the mediator) was a statistically significant predictor of job satisfaction. Perceived support for creativity was positively associated with job satisfaction ( $\beta = .44$ ,  $R^2$  change = .17,  $p < .0002$ ). Moreover, the effect of environmental distraction on job satisfaction decreased in the third mediation analysis ( $\beta = -.15$ ) as compared with its effect on the dependent variable in the second analysis ( $\beta = -.28$ ) and was no longer significant in the third analysis.

The previously noted main effects of social climate, environmental distraction, and perceived support for creativity at work on job satisfaction and

**Table 5.** *Effect of Social Climate on Job Satisfaction as Mediated by Perceived Support for Creativity at Work*

Variable	B on Entry	Se B	R <sup>2</sup> Change	p
Mediation Analysis 2				
Age	.10	.10		.36
Education	-.13	.14		.27
Job Status	.27	.16		.02
Importance of Creativity	-.003	.26		.98
Social Climate	.52	.21	.27	.0000
Mediation Analysis 3				
Perceived Support for Creativity at Work	.46	.08	.19	.0001
Social Climate	.42	.22	.15	.0001

Note: Analysis 2 final equation adjusted  $R^2 = .31$ ,  $F(5,76) = 8.23$ ,  $p = .0000$ . Analysis 3 final equation adjusted  $R^2 = .35$ ,  $F(6,75) = 8.38$ ,  $p = .0000$ .

**Table 6.** *Effects of Environmental Distraction on Job Satisfaction as Mediated by Perceived Support for Creativity at Work*

Variable	B on Entry	Se B	R <sup>2</sup> Change	p
Mediation Analysis 2				
Age	.09	.11		.42
Education	-.18	.15		.15
Job Status	.26	.17		.04
Importance of Creativity	-.08	.27		.50
Environmental Distraction	-.28	.01	.07	.0246
Mediation Analysis 3				
Perceived Support for Creativity at Work	.44	.08	.17	.0002
Environmental Distraction	-.15	.01	.02	.24

Note: Analysis 2 final equation adjusted  $R^2 = .09$ ,  $F(5,66) = 2.35$ ,  $p = .0501$ . Analysis 3 final equation adjusted  $R^2 = .21$ ,  $F(6,65) = 4.09$ ,  $p = .0015$ .



personal stress are summarized in Tables 7a, 7b, and 7c. The patterns of means shown in these tables illustrate that: (a) more favorable social climates are associated with lower levels of personal stress and greater job satisfaction, (b) higher levels of environmental distraction are associated with lower levels of job satisfaction, and (c) greater perceived support for creativity at work is associated with lower levels of personal stress and higher levels of job satisfaction.

**Table 7a.** Means for Personal Stress and Job Satisfaction × More and Less Favorable Social Climate

Social Climate	n	Personal Stress		Job Satisfaction	
		M	SD	M	SD
Less Favorable Social Climate	46	3.45	.65	3.30	1.17
More Favorable Social Climate	44	3.73	.79	4.25	.75

Note: Larger means indicate lower levels of personal stress and higher levels of job satisfaction. Social climate range = 1.38 to 4.00; median = 3.00. Main effect on personal stress,  $p < .02$ . Main effect on job satisfaction,  $p < .0001$ .

**Table 7b.** Means for Job Satisfaction × Low and High Levels of Environmental Distraction

Environmental Distraction	n	Job Satisfaction	
		M	SD
Low Distraction	39	3.96	1.11
High Distraction	39	3.74	1.04

Note: Larger means indicate higher levels of job satisfaction. Environmental distraction range = -1.99 to 3.75; median = -.16. Main effect,  $p < .025$ .

**Table 7c.** Means for Personal Stress and Job Satisfaction × Low and High Levels of Perceived Support for Creativity at Work

Perceived Support for Creativity at Work	n	Personal Stress		Job Satisfaction	
		M	SD	M	SD
Low Support for Creativity	47	3.47	.73	3.37	1.20
High Support for Creativity	46	3.65	.74	4.16	.80

Note: Larger means indicate lower levels of personal stress and higher levels of job satisfaction. Perceived support for creativity range = 1 to 7; median = 4.42. Main effect on personal stress,  $p < .002$ . Main effect on job satisfaction,  $p < .0001$ .

## Discussion

Significant relationships among social climate, levels of environmental distraction, and employees' perceived support for creativity at work were found. A more positive social climate was associated with greater perceived support for creativity at work, and high levels of environmental distraction were associated with less perceived support for creativity at work. Also, job satisfaction was significantly predicted by both social climate and levels of environmental distraction. Finally, perceived support for creativity significantly mediated the relationships between social climate and job satisfaction, social climate and personal stress, and environmental distraction and job satisfaction. That perceived support for creativity at work was not a significant mediator of the relationships between environmental distraction and personal stress may be attributable to the relatively greater influence of non-workplace factors on personal stress than on job satisfaction. That is, perceived support for creativity at work apparently played a less significant role in employees' appraisals of their "global stress" levels (Cohen et al., 1983) than in their assessments of job satisfaction.

All of the findings reported here are based on a series of stepwise regression analyses that were performed according to the criteria for testing relationships among predictor, mediator, and outcome variables, as outlined by Baron and Kenny (1986). Still, these findings must be characterized as exploratory and suggestive rather than conclusive, because of a number of limitations in the research design and scope of this study.

First, all analyses were based on cross-sectional rather than longitudinal data. Thus, we cannot infer causal relationships among the predictor, mediator, and dependent variables. For instance, the causal

direction of the links between environmental distraction or social climate in the workplace and perceived support for creativity at work cannot be ascertained from our data. We do not know whether a more favorable social climate promotes a higher level of perceived support for creativity at work, or whether greater perceived support for creativity engenders a more positive social climate. With regard to environmental distraction, it would seem more plausible that high levels of distraction undermine perceived support for creativity at work, rather than vice versa. Nonetheless, the cross-sectional nature of our research design precludes confirmation of the hypothesized relationships among these variables.

Second, the self-report measures of social climate, perceived support for creativity at work, personal stress, and job satisfaction were not cross-validated by objective or independent subjective indexes of these constructs. In future studies, observational measures of supportive relationships among coworkers and their supervisors, archival records, supervisory ratings of employees' innovations at work (cf. Oldham & Cummings, 1996), and physiological measures of stress could be used to reduce the likelihood of spurious findings based on the use of subjective independent variables (e.g., perceived social climate and support for creativity at work) to predict self-reported outcome measures (e.g., personal stress and job satisfaction).<sup>2</sup>

Third, all of the reported links among predictor, mediator, and outcome variables are based on employee self-reports or researchers' observations of existing conditions in five workplaces. None of the major variables were intentionally manipulated by the researchers to evaluate their relationships in a prospective fashion. In future studies, it would be most informative to design and implement interventions at the worksite intended to improve social climate, reduce environmental distraction, and enhance environmental support for creativity at work. Prospective evaluations of the effects of such interventions on employees' personal stress and job satis-

faction would provide a more direct and conclusive assessment of the hypotheses examined in this research.

Fourth, all predictor, mediator, and outcome variables examined in this study were measured at the individual level rather than at the group or organizational level. The small number of organizations (five) that participated in this study precluded the possibility of using the work group, company, or department (rather than individual employees) as the unit of analysis. On the one hand, the constructs of perceived support for creativity at work, job satisfaction, and work-related experiences of stress are most appropriately measured at the individual rather than aggregate level of analysis. On the other hand, a potential methodological problem inherent in our analyses of self-report measures is that the questionnaire responses of employees from the same work group or department are often interdependent rather than independent. To the extent that high levels of interdependence prevail among coworkers' in their responses to survey items, it is advisable to aggregate their data by work group, department, or company. Moreover, some studies of innovation at work have found that the effects of perceived social climate at work on employees' self-ratings of their innovations at work vary considerably, depending on whether social climate is measured at the group or individual level (Bunce & West, 1995). Future evaluations of the relationships among the predictor, mediator, and outcome variables examined in this study should compare individual- and group-level measures and analyses of these constructs.

Fifth, all of the participants in this study were full-time supervisory and staff-level office workers rather than blue collar employees within manufacturing settings or mobile worksites (e.g., vehicle operators and other nonoffice service workers). The generalizability of the reported links from offices to nonoffice worksites and blue collar employees remains as an important issue for future research on environmental predictors of perceived support for creativity and innovation in the workplace.

These limitations notwithstanding, this study suggested that physical and social features of work environments do influence employees' perceptions and experiences of creativity, and established a basis for future longitudinal studies designed to replicate and extend the cross-sectional relationships reported here.

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<sup>2</sup>In the UCI Facilities Survey, participants' heart rate and levels of systolic and diastolic blood pressure were recorded as objective indicators of personal stress. However, complete blood pressure and heart rate data were available for only a few of the 97 participants who responded to the Creativity Questionnaire.

Several authors have emphasized the importance of giving greater scientific attention to the joint influence of environmental and personal factors on creativity and innovation in work environments, as well as in other settings (Amabile, 1988; Clitheroe, 2000; Runco, 1995; Sternberg & Lubart, 1996). This study suggests new avenues for future research on creativity research by (a) offering new measures of employees' subjective experiences of creativity and perceived support for creativity at work, (b) indicating some of the ways both subjective and objective features of work environments (social climate and distraction) may influence perceptions of support for creativity at work, and (c) providing preliminary evidence that employees' perceptions of support for creativity at work are closely linked to reported levels of job satisfaction and stress.

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