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Perceived Work Environment and Cognitive Style

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Differences in perceived work environment are examined by age, gender, and occupation type, along with whether cognitive style predicts perceived work environment. The sample consists of 2185 men and women ranging in age from 21 to 93 years. Perceived work environment was measured using Moos's Work Environment Scale (WES) for the subscales of Autonomy, Control, and Innovation. The Test of Behavioral Rigidity (TBR) was used to measure cognitive style. Findings indicate significant mean level differences in perceived work environment based on gender, age, and occupation type. Hierarchical regression analyses indicated that perceived work environment predicted concurrent cognitive style beyond demographic variables.

Given the current demographic trends, the workforce is becoming increasingly older with fewer workers available at entry positions. Of interest perhaps now more than before is how characteristics of the workplace influence cognitive performance throughout the working life span. Research has shown that individual differences in cognitive performance can be attributed in part to demographic and personal attributes (Schaie, 1989). For example, factors shown to reduce the likelihood

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of decline in cognitive abilities include engagement in an intellectually stimulating and complex environment (Gribbin, Schaie, & Parham, 1980) and maintaining flexible personality attributes at midlife (Schaie, 1984). Further research is needed, therefore, to delineate particular job characteristics that moderate the relationship between cognitive functioning and age (Avolio & Waldman, 1990; Hoyer, 1998; Schooler, Caplan, & Oates, 1998). Additional knowledge of individual differences in cognitive performance will be gained by exploring dynamics of the work environment.

A prominent investigation of intellectual functioning and work characteristics is the work of Kohn and Schooler (1983). These researchers studied the direction of the causal effects between cognitive functioning and occupational self-direction. Occupational self-direction was defined as initiative, thought, and independent judgement concerning work which may be supported by some job conditions and hindered by others. Kohn and Schooler (1983) examined the reciprocal relationship between one dimension of occupational self-direction (i.e., substantive complexity of work) and one dimension of psychological functioning (i.e., intellectual flexibility). In 1964 and 1974, 3101 men were interviewed who were 16 years of age and older and employed in civilian occupations across the United States. A contemporaneous effect was found for substantive complexity on ideational flexibility, whereas, a lagged effect was found from ideational flexibility to substantive complexity. The effect of substantive complexity on ideational flexibility is thought to be immediate, indicating that requirements of one's present job influences one's present thinking patterns (Kohn & Schooler, 1983; Schooler, 1990). Job conditions may not be structured to allow variations in substantive complexity to meet the needs of workers, but over time workers may be more able to modify job conditions or switch to jobs more compatible with their intellectual functioning. These findings lend support to the view of a reciprocal relationship between job conditions and psychological functioning over time (Kohn & Schooler, 1983). Exposure to simple environments for lengthy periods may be detrimental to cognitive performance, especially intellectual flexibility (Schooler, 1987). Positive effects of occupational self-direction was also found for women, whereby participation in substantively complex and nonroutine work was positively related to ideational flexibility and reception to innovation and change (Kohn & Schooler, 1983). Cross-cultural similarities were also found in Poland (Miller, Slomczynski, & Kohn, 1985), and Japan (Naoi & Schooler, 1985; Schooler, 1996).

Avolio and Waldman (1990) examined whether job complexity and occupational type moderated the relationship between age and cognitive performance. Results indicate that job complexity was not a significant moderator, but a weak occupation by age interaction was found that predicted cognitive test scores. Job complexity accounted for the greatest

amount of variance in test performance compared to age and experience. Preferences regarding level of job complexity may illuminate how individuals with similar abilities will over time exhibit different rates of change in abilities (Avolio & Waldman, 1990; Farr, Tesluk, & Klein, 1998).

With the increasing age of the workforce, considering the relationships among aging, cognition, and work performance is important (Park, 1994). Compensatory mechanisms (e.g., collaboration and external aids, see Dixon, 1992, 1995, 1999) may be implemented in work situations to help maintain performance levels. Equal opportunities need to be provided for adult workers of any age who hold the same competence levels (Sterns, Barrett, Czaja, & Barr, 1994).

Job complexity has also been linked to work satisfaction. For example, Gould (1979) examined the influence of career stages on the relationship between job complexity and work satisfaction. Job complexity was defined as the degree that the job lacks repetition and routinization, fosters independent judgement, and demands creativity and originality. Results suggest a strong positive relationship between perceived job complexity and work satisfaction during the trial career stage (under 30 years of age). Repetti and Cosmas (1991) found a moderate relationship between quality of the social environment at work and job satisfaction among nonmanagerial bank employees. Spector (1986) reported that perceptions of control at work was positively related to job satisfaction, in addition to motivation, commitment, performance, and involvement (see also Sørensen, 1998).

Despite the existing knowledge on the relationship between job complexity and cognitive abilities, more information is needed to determine how other work conditions influence psychological functioning. Wooten, Barner, and Silver (1994) examined the influence of cognitive style upon preferences in the work environment. Among undergraduate students, they found an association between cognitive style (as defined by field independence) and perceptions of an ideal work environment. Field-independent individuals preferred work environments that fostered innovation and autonomy. Wooten et al. (1994) highlight the implications of a relation between work environment preferences, satisfaction, and performance, in light of job design and personnel cognitive characteristics.

The focus of the present study is to expand our knowledge of the relationship between perceived work environment and cognitive style. The dimensions of interest for characterizing the work environment include Moos's (1986) dimensions of Autonomy, Control, and Innovation from the Work Environment Scale (WES). The WES has been used in the past to assess how work environment relates to various psychological domains. These include, but not limited to, burnout (Turnipseed, 1994, 1998); and cognitive style (Wooten et al., 1994). The literature referred to in the introduction is primarily an account of descriptions of

the work environment rather than dealing with the subjective perceptions of the work environment which we are studying. Hence, it may be premature to suggest specific directional hypotheses. The hypotheses investigated are: (1) perceptions of the work environment will vary according to age and gender; (2) occupational type will moderate the age and gender relationship on perceived work environment; and (3) perceived work environment will predict and have an overall positive relation with cognitive style after controlling for demographic variables.

METHOD

Participants

The present sample consisted of participants who were drawn from the Seattle Longitudinal Study (SLS), an on-going longitudinal-sequential study of adult cognitive development. Participants were volunteers recruited at random, stratified by age and gender, from the membership of a Health Maintenance Organization (Group Health Cooperative of Puget Sound). Participants were drawn from two samples: The Family Study (siblings and adult children of the longitudinal sample tested in 1984), tested in 1989; and the Longitudinal Study, tested in 1991. The present sample was comprised of 2185 participants (1058 men and 1127 women) who ranged in age from 21 to 93 years ($M = 53.1$ years, $SD = 16.4$). The sample had a mean education level of 15.4 years ($SD = 2.6$, range = 7–21 years) and an estimated median income of $40,000. The participants worked in a number of occupations (ranging from blue collar (1) to professional (5), $M = 3.0$, $SD = 1.4$). The sample was disaggregated into nine age groups (see Table 1). The distribution of the levels of occupation across the nine age levels is presented in Table 1.

Measures

All participants were given a modified version of the WES (Moos, 1986). Three of the original 10 WES subscales were included in this study. Each scale was reduced to five items and measured on a 5-point Likert scale. Internal consistency reliability for the three subscales, Autonomy, Control, and Innovation, using Cronbach's alpha was .77 (.76), .78 (.76), and .68 (.86), respectively, with original subscale alpha levels in parentheses. This questionnaire measures participant's perceptions of their current work environment. Participants who were retired at the time of testing were asked to answer the questions based on their last major job. The subscales are as follows:

Autonomy. This scale measures the extent to which employees are encouraged to both make independent decisions and to be self-sufficient.

TABLE 1 Age and Occupation Type Distribution of the Sample

	Age group								
	1	2	3	4	5	6	7	8	9
Mean age	81	74	67	60	53	46	39	32	26
Range in years	78–93	71–77	64–70	57–63	50–56	43–49	36–42	29–35	21–28
Sample size	163	240	272	243	271	312	301	269	114
Occupation type									
Blue collar	37	47	56	40	42	44	47	62	30
Clerical/sales	23	59	58	47	57	47	55	46	37
Managerial	37	51	55	55	63	68	54	48	10
Semiprofessional	31	35	57	50	44	83	76	77	20
Professional	35	48	46	51	65	70	69	36	17

Control. This scale measures the extent to which rules and pressures are used by management to control their employees. This scale was reverse coded, such that a high score indicates greater perceived self-control in the work environment.

Innovation. This scale measures the degree to which variety, change, and novel approaches are emphasized.

The Test of Behavioral Rigidity (TBR)

The TBR contains three subtests that reflect measures of cognitive style (Schaie, 1996; Schaie & Parham, 1975). Three factor scores representing latent dimensions were derived from the TBR. Motor-Cognitive Flexibility (MCF) measures the individual's ability to shift between tasks and to adjust to change in demands. Attitudinal Flexibility (AF) measures the individual's ability to perceive and respond to new or unfamiliar patterns in cognitively induced situations. Psychomotor Speed (PS) measures the individual's rate in responding to familiar tasks.

Analyses

For all the analyses reported, alpha levels of $p \leq .05$ were specified to indicate statistical significance. The analyses conducted were as follows: (1) A 2 (gender) × 9 (age group) × 5 (occupation type) multivariate analyses of covariance (MANCOVA) was performed on the three Moos subscales. Post hoc comparisons of means was performed with Tukey's Honestly Significant Difference (HSD) test for unequal sample sizes; and (2) hierarchical regression was used to determine whether perceived work environment predicted cognitive style after controlling for demographic variables.

RESULTS

Differences in Perceived Work Environment By Gender, Age Group, and Occupation Type

A 2 (gender) × 9 (age group) × 5 (occupation type) MANCOVA with education as the covariate was conducted on measures of perceived work environment: Autonomy, Control, and Innovation. The combined perceived work environment scores were significant for gender ($F(3,2092) = 4.16$, $p < .01$), age group ($F(24,6068) = 6.74$, $p < .001$), occupation type ($F(12,5535) = 7.77$, $p < .001$), and a gender by occupation type interaction ($F(12,5535) = 3.14$, $p < .001$). The age group by occupation type interaction was not significant, indicating that age relations were similar across the five occupation categories. Examination of univariate tests revealed a significant main effect for gender on Autonomy and Innovation (see Table 2 for summary statistics). Men ($M = 20.91$, $SD = 3.87$) had higher scores on Autonomy than women ($M = 20.39$, $SD = 3.90$). Men ($M = 17.50$, $SD = 4.00$) also had higher scores on Innovation than women ($M = 17.09$, $SD = 4.08$).

Univariate tests revealed a significant main effect for age group on Control and Innovation (refer to Table 2 for summary statistics, and see Table 3 for adjusted means and standard deviations). Age group differences were found for perceived work environment. Post hoc analyses for the age group main effect revealed that on the Control measure, the oldest age group (1) did not differ from the second oldest age group (2) but scored lower than all other age groups (3 to 9). The second oldest age group (2) scored lower than most age groups (3 to 8). The third oldest age group scored lower than the fifth age group. The fourth age group scored lower than younger age groups (5 to 8). On the Innovation measure, the two oldest age groups (1 and 2) scored lower than the young and middle aged groups (5 to 8), and the second oldest age group scored lower than a middle aged group (4). The third age group scored lower than younger age groups (5 to 7).

Examination of univariate tests revealed a significant main effect for occupation type and a significant gender by occupation type interaction on all three measures of perceived work environment: Autonomy, Control, and Innovation (refer to Table 2 for summary statistics and Table 4 for adjusted means and standard deviations). Before reporting the results, further description of occupation type is in order. The blue collar category includes farming, assembly line jobs, protective occupations (police and firefighters), as well as skilled craftsperson; the clerical and sales category is self-explanatory. The managerial category includes both employed managers and self-employed small business proprietors. Semiprofessionals include occupations requiring a bachelor's

TABLE 2 Univariate Statistics for Perceived Work Environment

Source	*df*	*F*		
		Autonomy	Control	Innovation
Gender (G)	1	7.92**	.02	4.76*
Age group (A)	8	1.31	12.67***	6.92***
G × A	8	1.80	.49	1.63
Occupation (O)	4	10.16***	15.98***	12.84***
O × G	4	5.34***	4.43***	2.90*
O × A	32	1.11	1.25	1.11
O × G × A	32	1.14	1.43	1.12
Error	2094	(14.10)	(20.91)	(14.56)

Note. Analyses conducted were 2 (gender) × 9 (age group) × 5 (occupation type) MANCOVA ($N = 2185$). Values enclosed in parentheses represent mean square errors.

* $p < .05$; ** $p < .01$; *** $p < .001$.

degree (e.g., teachers, case workers, engineers, etc.), whereas professionals have the terminal degree of their field (Ph.D. or Master's, as appropriate).

Post hoc univariate analyses for the occupation type main effect revealed that workers in blue collar and clerical/sales jobs scored lower on the Autonomy measure than workers from all other occupations. On the Control measure, blue collar workers scored lower than all other workers. Clerical/sales workers scored lower than managerial and professional workers. Managerial workers scored higher than semiprofessional workers. On the Innovation measure, blue collar and clerical/sales workers scored lower than workers from all other occupations. Semiprofessionals scored lower than professionals (Figure 1).

TABLE 3 Mean Scores by Age Group on Measures of Perceived Work Environment

Variable	Age group								
	1	2	3	4	5	6	7	8	9
Autonomy	20.17	20.34	20.93	20.73	21.12	20.84	20.67	20.83	20.20
	(4.40)	(4.35)	(3.68)	(3.71)	(3.74)	(3.67)	(3.94)	(3.70)	(3.97)
Control	14.53	15.15	16.96	16.54	18.06	17.69	17.60	17.69	16.49
	(4.75)	(5.11)	(4.36)	(4.70)	(4.89)	(4.56)	(5.16)	(4.81)	(4.70)
Innovation	16.19	16.16	17.02	17.19	17.96	17.99	17.99	17.64	17.52
	(4.41)	(4.42)	(3.77)	(3.70)	(3.83)	(3.91)	(4.03)	(3.90)	(3.86)

Note. Values enclosed in parentheses represent standard deviations.

TABLE 4 Mean Scores by Occupation Type on Measures of Perceived Work Environment

Dependent variable	Blue collar	Clerical/ sales	Managerial	Semi-professional	Professional
Autonomy					
T	19.77	20.39	21.63	20.77	20.68
	(4.53)	(4.39)	(3.33)	(3.27)	(3.46)
M	19.23	21.00	21.93	21.18	21.20
	(4.85)	(4.39)	(3.15)	(3.15)	(3.15)
W	20.31	19.78	21.33	20.35	20.17
	(3.98)	(4.36)	(3.50)	(3.39)	(3.74)
Control					
T	15.40	16.80	18.25	16.71	16.57
	(5.13)	(4.95)	(4.59)	(4.50)	(4.95)
M	14.64	16.87	18.20	16.91	17.21
	(4.86)	(5.14)	(4.60)	(4.39)	(4.77)
W	16.15	16.73	18.31	16.51	15.94
	(5.30)	(4.89)	(4.59)	(4.61)	(5.09)
Innovation					
T	16.29	16.76	18.27	17.35	17.81
	(4.20)	(3.93)	(3.86)	(3.84)	(3.81)
M	16.07	17.48	18.66	17.49	17.81
	(4.06)	(3.91)	(3.89)	(3.71)	(3.73)
W	16.51	16.04	17.87	17.22	17.82
	(4.36)	(3.90)	(3.79)	(3.98)	(3.93)

Note. Values enclosed in parentheses represent standard deviations. T = total sample; M = men; W = women.

The significant main effect for occupation type is qualified by a significant gender by occupation type interaction. Post hoc univariate analyses revealed that on the Autonomy measure, men and women in their respective occupation categories did not differ from each other. Men in blue collar jobs scored lower than men and women in most occupation categories. Women in clerical/sales jobs scored lower than men in managerial, semiprofessional and professional jobs and women in managerial jobs. Women in blue collar jobs scored lower than men in managerial and professional jobs. Men in managerial jobs scored higher than women in semiprofessional and professional jobs. Men in professional jobs scored higher than women in semiprofessional jobs (Figure 2). On the Control measure, men in blue collar jobs had the lowest score. Men and women in clerical/sales, managerial, and semiprofessional jobs did not differ in their respective occupation categories. However, for professional jobs men scored higher than women, whereas in blue collar jobs women scored higher than men. Women in clerical/sales jobs scored lower than men and women in managerial jobs, and men in professional

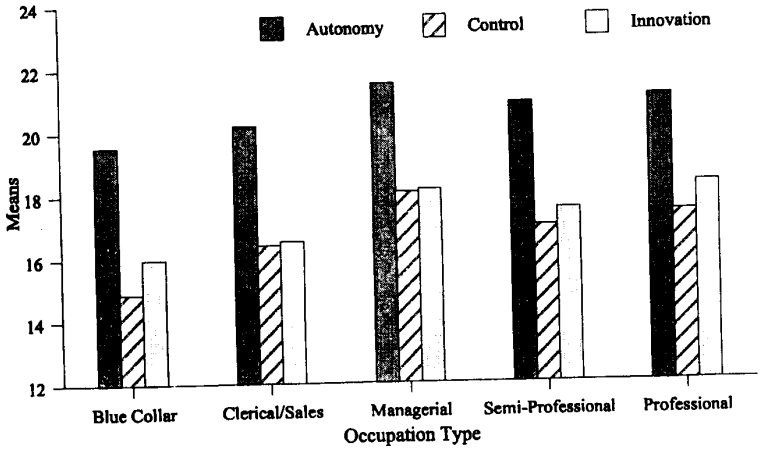

FIGURE 1 Mean differences in perceived work environment by occupation type.

jobs. Women in blue-collar jobs scored lower than men and women in managerial jobs, and men in professional jobs. Men in managerial jobs scored higher than women in professional jobs (Figure 3). On the Innovation measure, men and women did not differ from each other in their

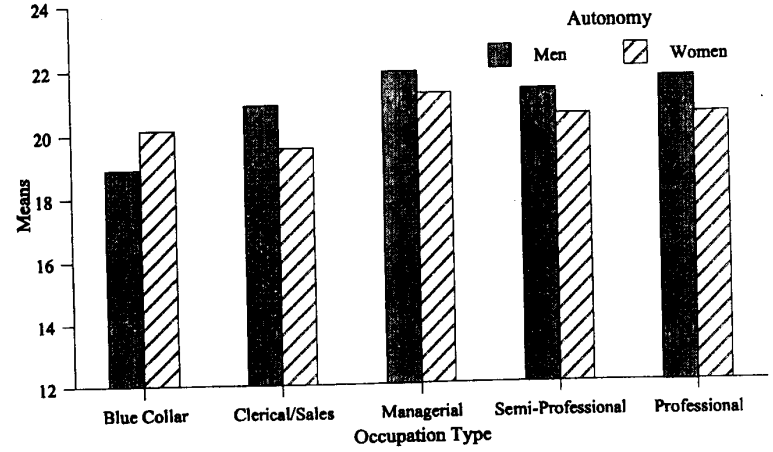

FIGURE 2 Mean differences in perceived autonomy in the work environment by occupation type and gender.

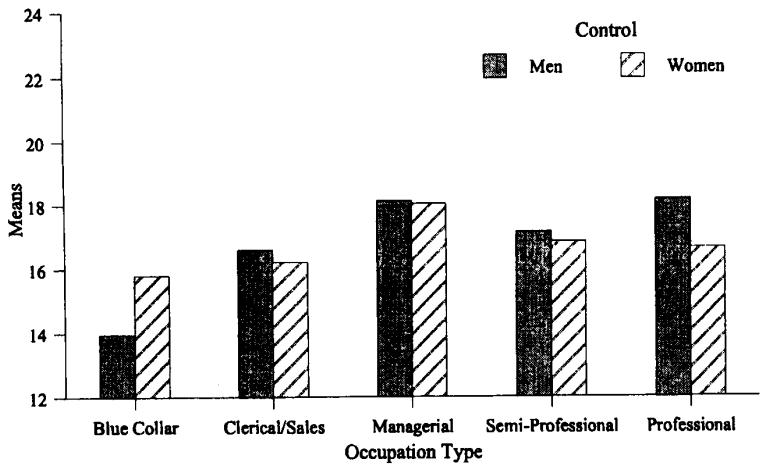

FIGURE 3 Mean differences in perceived control in the work environment by occupation type and gender.

respective jobs. Women in clerical/sales jobs scored lower than men and women in managerial, semiprofessional and professional jobs. Men in blue collar jobs scored lower than men in clerical/sales jobs, and men and women in the remaining occupations. Men in managerial jobs

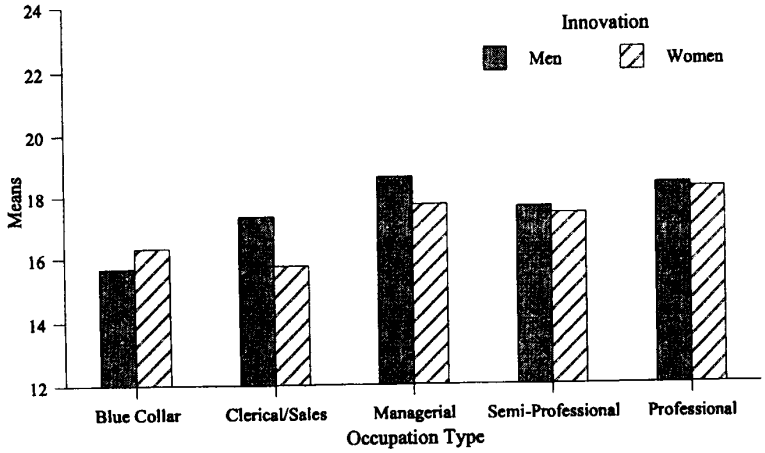

FIGURE 4 Mean differences in perceived innovation in the work environment by occupation type and gender.

TABLE 5 Hierarchical Regression Analysis Predicting Cognitive Style

Predictors	Attitudinal flexibility			Motor-cognitive flexibility			Psychomotor speed		
	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2
Model 1		.06***	—		.06***	—		.23***	—
Gender	−.06**			.04*			−.25***		
Education	.26***			.26***			.42***		
Occupation type	−.04			−.03			.01		
Model 2		.11***	.05**		.10***	.04**		.29***	.06**
Gender	−.05**			.05*			−.25***		
Education	.21***			.21***			.36***		
Occupation type	−.05*			−.04			−.00		
Autonomy	−.14***			−.07*			−.11***		
Control	.21***			.20***			.26***		
Innovation	.15***			.09**			.12***		
Model 3		.15***	.04**		.30***	.20**		.47***	.18**
Gender	−.03			.08***			−.21***		
Education	.17***			.12***			.28***		
Occupation type	−.03			.01			.05**		
Autonomy	−.11***			.02			−.04		
Control	.17***			.11***			.17***		
Innovation	.12***			.02			.05**		
Age	−.20***			−.47***			−.44***		

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

scored higher than women in semiprofessional jobs. Women in blue collar jobs scored lower than men and women in managerial and professional jobs, and men in semiprofessional jobs (Figure 4).

Perceived Work Environment and Cognitive Style

Hierarchical regression analyses were used to examine the concurrent relationship between perceived work environment and cognitive style while controlling for demographic variables. Because demographic variables such as gender, education, and occupation type will account for a significant portion of the variance in cognitive style, the test of a significant amount of additional variance explained by work variables will be more conservative. Occupation type was included as a categorical variable in the regression analyses with values ranging from blue collar (1) to professional (5). Given the potential differences in the regression patterns for men and women, analyses were first conducted separately by gender. The pattern of predictors was comparable for men and women, whereby the same predictors added at each consecutive model was significant for each dimension of cognitive style. Hence, both groups were combined for further analyses and gender was used as a demographic predictor. The first model included gender, education, and occupation type to determine the effects of demographic variables on cognitive style. The second model included the demographic variables, followed by the work variables, to determine the effects of work after controlling for demographic characteristics. The third model included the demographic and work variables, followed by age, to determine the variance that remains related to age after individual differences in perceived work environment were controlled.

The results of the analyses are reported in Table 5, and indicate that perceived work environment predicted cognitive style after controlling for gender, education, and occupation type. Perceived work environment accounted for an additional 4% to 6% of the variance in Attitudinal Flexibility, Motor-Cognitive Flexibility, and Psychomotor Speed. Age accounted for an additional 4% to 20% of the variance in the three measures of cognitive style.

DISCUSSION

The present study focused on differences in perceived work environment, and the relation between perceived work environment and cognitive style. The results of this study provide further support for Kohn and Schooler's (1983) research on occupational conditions and intellectual functioning. Indeed, findings from the hierarchical regression analyses indicate that perceived work conditions predicts cognitive style. Our findings also support and extend those of Wooten et al. (1994) in that not

only preferences, but also perceptions of the work environment, relate to cognitive style.

Age accounted for a substantial amount of variance, indicating that systematic differences by age exist that remain to be explained. Discussion of the age group differences in perceived work environment requires a caveat. Although the small age group differences in autonomy, control, and innovation were statistically significant, they may not be practically significant given the large sample size. There appears to be stability in autonomy across age groups, a curvilinear shape in age differences for control, and a drop in perceived innovation from middle age to old age. The decline in innovation may be due to a period or cohort effect regarding occupation type. Possible explanations for age differences in control include the likely event that young adult workers may not have gained the experience required to be given such responsibilities, whereas older adult workers may have reached fatigue or have chosen to invest more resources on the nonwork environment. By allowing older adult workers to make their own decisions, emphasizing variety and change, and minimizing rules may enable the worker to become more engaged in his or her work environment, thereby reducing the risk of cognitive decrement throughout the working life span (Gribbin et al., 1980; Schooler, 1990). Another possible explanation for the age differences that cannot be ruled out is that age group may be confounded with job opportunities and historical shifts in job characteristics, such that jobs at the time that the data were collected may be characteristic of control and innovation.

Not surprising, the current study indicates that workers in relatively less complex jobs reported less perceived autonomy, control, and innovation in the workplace. In addition, occupation type has been shown to influence the relationship between gender and perceived work environment. Implications of these findings are that new job tactics need to be introduced in the work setting to support occupational self-direction as described by Kohn and Schooler (1983) and intellectual stimulation that may enhance job performance. Schooler (1987) claims that factors needed to foster the development or maintenance of high levels of cognitive abilities and self-directedness (e.g., awards and incentives) may not be characteristic of simple environments. Thus, we need to learn and seek out how environments that lend themselves to suitable levels of cognitive functioning can be supported (Schooler, 1987; Schooler, Caplan, & Oates, 1998). Appropriate feedback may reinforce workers to seek out intellectually demanding tasks, thereby benefitting cognitive performance (Avolio & Waldman, 1990). Age per se does not directly affect job performance, rather age relations are influenced by ability and other factors (Salthouse & Maurer, 1996). Learning how and which contextual factors lead to the maintenance and decrement in cognitive functioning is crucial given the recent changes in the age distribution.

Further caveats are in order. First, given the noncausal nature of the design, caution is warranted in the interpretation of findings. Second, the report on perceived work environment was concurrent for those still working, but retrospective for those retired. Also potentially problematic is the criteria for last major job held for those individuals who were retired at the time of testing. Given the array of interpretations and experiences, the adoption of the same criteria for reporting one's last major job is unlikely. Of future interest would be to directly ask participants what constitutes their last major job before retirement and why. Third, the lower alpha for the modified Innovation scale may be problematic and requires further investigation. Finally, the relationships determined in this study may be of secular specificity, and subject to changes in the work environment.

The present study does not include longitudinal data, thus directionality effects cannot be determined. Future longitudinal research is necessary to test whether competent individuals are selected into jobs or whether job conditions and experiences influence cognitive abilities (Avolio & Waldman, 1990).

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