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CROSS-LEVEL REPLICATION AND EXTENSION OF STEEL AND RENTSCH'S (1995) LONGITUDINAL ABSENCE FINDINGS

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ABSTRACT: Absenteeism findings published by Steel and Rentsch (1995) were replicated and extended by correlating attitudinal, personal-demographic, and job stress variables with 34 months of work group absenteeism scores obtained on employees of a U.S. federal mint. Attitudinal and job stress results were consistent with previous findings, but results involving personal-demographic variables were not.

KEY WORDS: absenteeism; longitudinal study; job stress; job satisfaction; job involvement.

Steel and Rentsch (1995) studied the absenteeism of 402 U.S. Department of Defense employees. They found that job satisfaction ($r = -.15$, $p < .05$) and job involvement ($r = -.14$, $p < .05$) were significantly correlated with a measure of time-lost absence that had been cumulated over a 70-month period. They also found that gender ($r = -.39$, $p < .05$) and education level ($r = -.36$, $p < .05$) were accurate predictors of long-term absenteeism. By way of contrast, three scales measuring job stress/stressors (e.g., role conflict) failed to predict the long-term absence crite-

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rion. The present study attempted to replicate these findings and extend this research to data aggregated to a group level of analysis.

Steel and Rentsch's (1995) findings are important because they suggest that absence predictions may be more temporally-sustainable than many had assumed possible (Harrison & Martocchio, 1998). Steel and Rentsch (1995) determined that one set of factors affecting the predictability of their absenteeism data was the distributional properties (i.e., levels of skew and kurtosis) of the absence measures themselves. Their data indicated that absence distributions manifesting high amounts of skew and kurtosis were less amenable to prediction. Temporal mechanisms played a role in this process because, for some types of absence metrics (e.g., time lost measures), extending the period of data cumulation helped to normalize the absence distributions.

CROSS-LEVEL ABSENCE RESEARCH

Absenteeism has been studied primarily as an individual-level outcome (e.g., Hackett, Bycio, & Guion, 1989; Hammer, Landau, & Stern, 1981; Johns, 1978). This approach is rooted in an "absence as decisional choice" paradigm. However, in something of a departure from the traditional perspective, recent research has examined absenteeism as group-level phenomena (e.g., George, 1990; Mathieu & Kohler, 1990).

Cross-level absence research acknowledges the social context in which absence decisions are made. This approach argues that social norms and absence cultures affect an employee's attendance decisions (Johns & Nicholson, 1982; Mathieu & Kohler, 1990; Nicholson & Johns, 1985). These decisions are influenced, it is argued, by sentiments and feelings that result from the shared experiences of group members. Moreover, these group-level phenomena may defy attempts at data reductionism. As products of collective experience, they may have properties and dimensionalities that are not duplicated in their individual-level analogs. The proper study of group-level phenomena may require group-level analyses because individual-level approaches fail to incorporate all relevant sources of variance.

Extant findings suggest that group-level mechanisms have a role in shaping absenteeism. For example, Harrison and Shaffer (1994) found that an employee's perceptions of absence norms affected his or her own absenteeism. Mathieu and Kohler (1990) showed that group absence rates predict individual absenteeism. George (1990) aggregated measures of employee morale to the group level of analysis. She found that her aggregated attitudinal measures were significant predictors of departmental absence statistics.

The current study sought to replicate Steel and Rentsch's (1995)

findings on a sample of workers from the U.S. Department of the Treasury. The longitudinal focus of the original study was retained in the present study by collecting absence measures over a 34-month period.

Earlier cross-level findings described by George (1989, 1990) indicated that group-level predictors (e.g., group morale) of absenteeism are related to, but not exact duplicates of, their individual-level counterparts (e.g., individual employee morale). Many of the same predictor variables used by Steel and Rentsch (1995) were incorporated into the present study, but we extended their findings by focusing the current research on the group-level of analysis. Because the same measures were used in both studies, the two sets of findings present a rare opportunity for cross-sample comparisons of aggregated and individual-level findings.

METHOD

Sample

Data for the study were provided by 234 employees of a United States federal mint. The sample contained 163 wage grade employees, 42 general schedule civil service employees, and 29 unclassifiable respondents. The typical respondent was a male (92% of the total) between the ages of 41 and 50. Average education levels corresponded to the response option "some college work."

Procedure

Federal mints resemble small manufacturing plants because they produce a tangible product and employ a labor force of wage-grade skilled and semi-skilled laborers (e.g., printing press operators). The mint employed a total of 313 employees. It was organized into 26 functional departments.

Surveys were administered to employees in group meetings on two occasions separated by a period of 14 months. Employees were told that their participation was voluntary and that all responses would remain confidential. The participation rate in the inaugural data collection was 75%.

Survey responses were aggregated to the group level of analysis by averaging individual results. When Survey 1 was administered, at least two respondents from 22 of the 26 departments participated. In addition, the Labor Relations Office was a one-person operation, and we decided to treat this person's responses as the result for that department. On average, there were 9 respondents per department. Survey 2 yielded valid data from 20 departments.

Measures

Descriptive statistics and intercorrelations for all of the study's predictor variables are shown in Table 1. Test-retest values for the study's attitudinal measures are located in the table's main diagonal. Because the data were aggregated to the group level and sample sizes were small, marginally significant findings ($p < .10$) have been identified throughout. Several authors have commented on the arbitrary nature of traditional alpha levels and the inferential bias associated with their mechanical application (Sauley & Bedeian, 1989; Schmidt, 1996).

Job Satisfaction. Job satisfaction was measured by a 5-item scale developed originally by Andrews and Withey (1976). A sample item asked, "How do you feel about the work you do on your job—the work itself?" Response choices ranged from (1) "terrible" to (7) "delighted."

Rentsch and Steel (1992) correlated the Andrews and Withey (1976) instrument with overall satisfaction scores derived from both the Job Descriptive Index and the Minnesota Satisfaction Questionnaire ($rs = .70$, $p < .05$). Alpha analysis based on the present data yielded a value of .77 for this measure.

Job Involvement. Our measure of job involvement was based on Saleh and Hosek's (1976) compilation and factor analysis of job involvement items. Sets of five, five, and three items were used to measure Saleh and Hosek's work participation (WP; $\alpha = .83$), central life interest (CLI; $\alpha = .91$), and self-concept (SC; $\alpha = .71$) job involvement dimensions, respectively. Responses were recorded on 7-point agree-disagree rating scales.

Job Stress. A global evaluation of job stress was derived from a set of three items studied previously by Schaubroeck, Cotton, and Jennings (1989). A sample item from this scale stated, "My job (e.g., the type of

Table 1
Intercorrelation Matrix

Variable	M	SD	1	2	3	4	5	6	7	8
1. Age	4.9	.5	—							
2. Education level	3.0	.8	.49*	—						
3. Gender	23.0	37.5	–.32†	.09	—					
4. Job satisfaction	24.6	3.5	–.03	–.24	.06	(.49)				
5. Job involvement (WP)	23.7	5.0	.18	.10	.19	.60**	(.80)			
6. Job involvement (CLI)	14.2	3.2	–.07	–.44*	–.05	.65**	.57**	(.33)		
7. Job involvement (SC)	17.7	1.6	.21	.02	.30	.41†	.64**	.28	(.74)	
8. Job stress	12.6	2.1	.05	–.24	–.60**	.30	.03	.30	.41†	(.18)

Note. N = 23; values shown in parentheses are test-retest statistics.
†$p < .10$. *$p < .05$. **$p < .01$.

work, amount of responsibility, etc.) causes me a great deal of personal stress and anxiety." Reliability analysis on this measure produced an alpha value of .74.

Personal-Demographic Variables. Demographic measures were obtained during Survey 1. Respondents indicated their age on a 7-point scale with response options ranging from "less than 20" (coded 1) to "more than 60" (coded 7). Education level was measured with an 8-point ordinal scale. The gender composition of each department was determined from organizational records. For purposes of the current study, gender was expressed as a ratio of the number of females in a department relative to total departmental staffing.

Absenteeism. Federal civil service employees are granted 13 days of sick leave per year, which may be used at the employee's discretion or banked indefinitely. Unused sick leave provides employees with a hedge against wage loss in the event of short-term disability. It also has retirement-benefit implications. When an employee's pension benefits are calculated at the time of retirement, unused sick leave may be counted as accrued service time.

Aggregate departmental sick leave usage statistics were reported by the organization on a monthly basis for a period spanning 34 months. Each data element represented the total *time lost* (i.e., in hours) during a month by a department as a result of employee sick leave. Because departments in the mint differed in size, we converted the sick leave data to pro rata statistics by dividing each department's monthly sick leave total by the number of employee's in the department.

RESULTS

Absenteeism scores for the twenty-three departments in the study were cumulated over differing-length intervals. The data were cumulated over periods of 2 months, 6 months, 12 months, 24 months, and 34 months. Table 2 provides summary statistics describing the distributional properties (i.e., mean, standard deviation, skew, kurtosis) of each type of data cumulation.

Steel and Rentsch (1995) reported high levels of skew ($g_1 = 6.4$) and kurtosis ($g_2 = 62.9$) in individual-level absence data that had been cumulated over a two-month period.[1] By partitioning the current data into similar-sized segments, we were able to compute average skew and kur-

[1]According to Hammer and Landau (1981), skewness indices (g_1) greater than $|2.00|$ and kurtosis indices (g_2) greater than $|5.00|$ represent radical departures from normality. The values of g_1 and g_2 equal zero when distributions are normal.

Table 2
Distributional Properties of Differing-Length Absence Cumulations

Type of Cumulation	N of Estimates	M	SD	Kurtosis	Skew
Two months	17	17.2	11.5	2.0	1.1
Six months	6[a]	51.0	26.9	1.5	1.0
Twelve months	3[a]	101.9	48.0	2.0	1.0
Twenty-four months	1	199.2	86.1	.2	.3
Thirty-four months	1	291.8	122.3	.9	.4

[a]One estimate from each set was partially based on prorated statistics.

tosis values across 17 separate estimates. As Table 2 shows, the present study's group data yielded 2-month skew ($g_1 = 1.1$) and kurtosis ($g_2 = 2.0$) values that were substantially smaller than those obtained by Steel and Rentsch.

In fact, the current data yielded markedly lower skew and kurtosis values in every type of absence cumulation examined. Apparently, aggregating absence scores to the group level of analysis reduces the likelihood that these kinds of measures will be identified with irregular data distributions.

Steel and Rentsch (1995) correlated three sets of predictors (i.e., attitudinal, personal-demographic, job stress) with annualized and total-score measures of absenteeism. To facilitate comparison with the Steel and Rentsch findings, the current absenteeism data were configured similarly. The absence data were partitioned into annualized segments. Year 1 and Year 2 absenteeism measures summarized complete calendar-year periods, but Year 3's data corresponded to a period of 10 months. In addition, a total score was computed by summing absence values across the entire 34-month period of the study.

Correlational statistics for all predictor-absence relationships are provided in Table 3. Survey 1 results ($N = 23$) are shown in the top-half of the table, and Survey 2 results ($N = 20$) are contained in the bottom portion of the table. Consistent with earlier findings (Steel & Rentsch, 1995), current results indicated that job satisfaction and job involvement were significantly correlated with the absenteeism measures. Satisfaction and involvement scales predicted the annualized absenteeism scores and the measure of long-term absenteeism (i.e., total score). Results involving the attitudinal measures were similar across both surveys, with the total-score results achieving an impressive degree of cross-survey consistency.

Results involving the stress measure were similar to the earlier findings of Steel and Rentsch (1995). Both studies found that this measure of job stress was a poor predictor of absenteeism.

Table 3
Predictor-Absence Correlations

	Absence Cumulations			
Predictor Variable	Year 1 r	Year 2 r	Year 3 r	Total Score r
Results of Survey 1 (N = 23)				
Age	–.05	.01	.00	–.02
Education level	.06	.09	.05	.08
Gender	–.36†	–.35†	–.16	–.35†
Job satisfaction	–.61**	–.50*	–.48*	–.63**
Job involvement, WP	–.61**	–.54**	–.37†	–.60**
Job involvement, CLI	–.55*	–.37†	–.50*	–.56**
Job involvement, SC	–.55*	–.39†	–.03	–.39†
Job stress	–.02	–.16	–.03	.04
Results of Survey 2 (N=20)				
Job satisfaction	–.80**	–.11	–.19	–.48*
Job involvement, WP[a]	–.76**	–.43†	–.48*	–.69**
Job involvement, CLI	–.16	–.32	–.63**	–.43†
Job involvement, SC	–.70**	–.32	–.14	–.50*
Job stress	–.15	–.05	–.21	.16

[a]N = 19 for this variable only.
†p < .10. *p < .05. ** p <.01.

Steel and Rentsch's (1995) study indicated that education level and gender were excellent predictors of long-term absenteeism. Current findings did not agree with that earlier work. Education level failed to predict long-term absenteeism (r = .08, n. s.), and the current study's measure of gender (i.e., departmental gender composition) produced only a weak relationship (r = –.35, p < .10) with long-term absenteeism.

Multiple correlation analysis evaluated the predictive utility of the entire predictor set. A three-block hierarchical model regressed long-term absenteeism on the demographic, job stress, and attitudinal predictors used in the study. Results of this analysis are summarized in Table 4. Regressing long-term absenteeism on the demographic measures produced a marginally significant relationship (p < .10) between gender and the absence criterion. The second block's job stress measure failed to add significantly to the model. When the attitudinal variables were added to the model in Block 3, job satisfaction (B = –.61, ΔR^2 = .29, p < .01) emerged as a significant predictor of long-term absenteeism.

DISCUSSION

Results of the current study replicated a portion of Steel and Rentsch's (1995) original findings. Like that earlier work, we found that attitudinal

Table 4
Hierarchical Regression Results

Predictor Block	B	R	ΔR^2
Block 1: Demographic Variables			
Gender	–.46†	.43	.19†
Age	–.29		
Education	.27		
Block 2: Stress Variables			
Job Stress	–.26	.48	.04
Block 3: Attitudinal Variables			
Job satisfaction	–.61**	.72	.29**
Job involvement, WP	–.20		
Job involvement, CLI	–.28		
Job involvement, SC	.11		

Note. N = 23.
†p < .10. *p < .05. ** p <.01.

measures (i.e., job satisfaction, job involvement) predicted long-term absenteeism (i.e., cumulated over 34 months). Also, consistent with Steel and Rentsch (1995), we found that job stress was poorly correlated with long-term absenteeism.

Steel and Rentsch (1995) concluded that personal-demographic variables (i.e., gender and education level) were better predictors of long-term absenteeism than were attitudinal measures. Current findings failed to support that conclusion. Instead, present findings indicated that the attitudinal measures were the superior predictors.

Level-of-analysis differences between the two studies may account for the discrepant findings. Personal factors may be excellent predictors when used to describe manifest characteristics of individuals. There is little ambiguity associated with assigning classificatory descriptors (e.g., male, high school graduate, etc.) to individual employees. However, the informational precision of these variables may be materially altered when they are used as summary descriptors for entire groups of people. Two groups can, for example, have the same mean age while also having radically different intra-group age distributions.

In contrast, aggregating attitudinal responses across individuals may not necessarily dilute the meaning of attitudinal variables. Instead of subtracting meaning, the aggregation of attitudinal responses may actually add levels of meaning to the scores. Aggregated attitudes may tap into shared experience in ways that individual attitudes are incapable of duplicating (George, 1990). These kinds of measures may be useful in showing the effects of social system factors (e.g., absence norms, absence cultures) on attendance decisions (Mathieu & Kohler, 1990). Until

recently, the discipline's predilection for individual-level absence research has kept group-level factors affecting absenteeism largely out of the picture.

Multiple correlation analysis indicated that job satisfaction predicts long-term absenteeism. It also indicated that the current study's collection of attitudinal predictors was highly overlapping with respect to their criterion-score content. Individual-level research has suggested that attitudinal measures are not redundant when used as predictors of absence behavior (Blau & Boal, 1987; Farrell & Stamm, 1988; Steel & Rentsch, 1995). In contrast, the present study's group data suggested that the predictor space occupied by attitudinal variables in group-absence research may be unidimensional.

Steel and Rentsch (1995) found that data distributions produced by short-duration absence cumulations (e.g., 2 months, 6 months) were skewed and leptokurtic. However, the current study's absence distributions were not materially affected by the length of data cumulation periods. Again, level-of-analysis factors may account for study differences. A distinctive feature of individual-level absence distributions is their inclusion of a disproportionately large number of null cases. It is commonly found that a large portion of the employees in the typical absenteeism study have perfect attendance. Steel and Rentsch (1995) showed that cumulating absence scores over increasingly lengthier reporting periods reduced the number of zero-absence cases. It also led to more-symmetrical data distributions.

The current study's aggregated absence data appeared to be less susceptible to these kinds of problems. Even when the data were cumulated over short-duration periods (i.e., two months), distributions with acceptable levels of skew and kurtosis were obtained. Apparently, aggregating the absence data to the group-level of analysis reduces the incidence of zero-absence cases and the distributional asymmetry their presence engenders.

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