Efficacy Beliefs as a Moderator of the Impact of Work-Related Stressors: A Multilevel Study

Steve M. Jex
University of Wisconsin—Oshkosh and Walter Reed Army Institute of Research

Paul D. Bliese
Walter Reed Army Institute of Research

This study built on previous exploratory research (S. M. Jex & D. M. Gudanowski, 1992) that examined both self-efficacy and collective efficacy as moderators of stressor–strain relations. Based on survey data collected from 2,273 U.S. Army soldiers representing 36 companies, it was found that both self- and collective efficacy moderated the relationship between stressors and strains. Multilevel random coefficient model results revealed that respondents with strong self-efficacy reacted less negatively in terms of psychological and physical strain to long work hours and work overload than did those reporting low levels of efficacy. In addition, respondents with high levels of self-efficacy responded more positively in terms of job satisfaction to tasks with high significance than did those with low efficacy. The results also revealed that group-level collective efficacy moderated the relationship between work overload and job satisfaction and between task significance and organizational commitment. Limitations of the study and implications of these findings are discussed.
much less is known about the determinants, measurement, or consequences of collective efficacy.

Since Bandura (1977, 1982, 1997) proposed his theory of self-efficacy, organizational researchers have recognized the many and varied applications of this construct (e.g., Gist, 1987). Most individual-level self-efficacy research in industrial–organizational psychology, however, has focused on performance management (e.g., Taylor, Locke, Lee, & Gist, 1984) and training issues (e.g., Gist, 1989; Gist, Bavetta, & Stevens, 1990; Saks, 1994) while ignoring other implications of this variable. Research into group-level efficacy beliefs, not surprisingly, has focused on the impact of this variable on group performance (Guzzo et al., 1993; Riggs & Knight, 1994).

We believe that efficacy theory (both at the individual and group level) should be applied to occupational stress research for two major reasons. First, at the individual level, self-efficacy is likely to have an impact on the way in which employees cope with stressors in the workplace (Leiter, 1991; Stumpf, Brief, & Hartman, 1987). It has been shown, for example, that individuals with high levels of self-efficacy tend to use problem-focused coping strategies, whereas the coping strategies of those with low self-efficacy tend to be more emotion-focused. Put another way, individuals with high self-efficacy are likely to do something about stressors, whereas those with low self-efficacy have a greater tendency to worry about them. Not surprisingly, compared to emotion-focused strategies, problem-focused coping strategies have been shown to facilitate more adaptive responses to stressors (Kinicki & Latack, 1990; Lazarus & Folkman, 1984).

Levels of self-efficacy may also influence individuals’ preferences for different types of jobs and work environments. Compared to those with low self-efficacy, individuals with high levels of self-efficacy would likely be more comfortable in “high scope” jobs where they can exercise personal judgment and function relatively independently (Hackman & Oldham, 1980). Consistent with this point, Saks (1994) found the relation between job-specific efficacy and anxiety among a sample of new employees to be moderated by self-efficacy. Those with high self-efficacy preferred a relatively informal tutorial training program, whereas those with low self-efficacy preferred more formal orientation and training. Given this preference, it is possible that individuals with high self-efficacy would not be averse to performing jobs where the consequence of error is high, or where role requirements are ambiguous. In contrast, individuals with low self-efficacy would likely find such jobs stressful. Individuals with high self-efficacy would probably find it stressful to be in jobs that offered little challenge and provided few opportunities to use their skills (Matsui & Onglatco, 1992).

Group-level efficacy beliefs may also play an important role in occupational stress, although in a different manner than individual-level efficacy beliefs. We suggest that a strong sense of collective efficacy may contribute to both a positive interpersonal climate and greater cooperation and helping among group members. This positive interpersonal climate may buffer the effects of stressors by providing group members with emotional support during stressful periods (Cohen & Wills, 1985; Gore, 1987), and may have a buffering effect by providing group members with the means necessary to actually reduce stressors (Beehr, 1995). What we are arguing, in effect, is that the moderating effect of collective efficacy represents a “cross-level” process (Klein, Dansercoeur, & Hall, 1994) in which a contextual or environmental factor (collective efficacy) influences individual-level relationships between stressors and strains.

Given these conceptual links, it is surprising that more research has not examined the impact of efficacy beliefs on the occupational stress process. In one of the few studies that has examined this issue directly, Jex and Gudanowski (1992) examined the moderating effects of both self- and collective efficacy beliefs. This study found little evidence to suggest that self-efficacy functioned as a moderator variable. Collective efficacy, however, was found to have moderating effects. The most consistent finding in this study was that collective efficacy moderated the relationship between work hours and job satisfaction or dissatisfaction, anxiety, and turnover intent. Longer work hours were most strongly associated with each of these three strains among individuals who perceived their groups to have low levels of collective efficacy.

Although the findings of the Jex and Gudanowski (1992) study are certainly provocative, the study was limited in two major respects. First, the sample size (n = 154) may not have provided adequate statistical power to uncover moderator effects (Aguinis & Stone-Romero, 1997). In several cases, nonsignificant interactions between stressors and individual-level efficacy beliefs explained 1–2% of the variance in outcomes, suggesting that moderator effects may have been present, although these effects may have been small.

A second and more serious limitation is the fact that all data for this study were analyzed at the individual level. Although this obviously does not present a problem for the analysis of self-efficacy, it represents a serious problem when assessing the effects of collective efficacy. According to Guzzo et al. (1993), collective efficacy (termed “group potency” by these authors) represents the collective perception of the members of a group. Jex and Gudanowski (1992), unfortunately, did not aggregate the collective efficacy measure to the appropriate level of analysis (e.g., work groups). In fact, it was unclear from this study whether members of their sample (university employees) even belonged to meaningful groups.
The Current Study

Given the limitations inherent in the Jex and Gudanowski (1992) investigation, more research investigating the impact of efficacy beliefs (individual and collective) on the relationship between stressors and strains is clearly warranted. The current study was designed with this objective in mind. Specifically, we examined relations between stressors (work overload, work hours, and task significance) and a number of strain indices (job satisfaction, organizational commitment, psychological strain, and physical symptomatology). Both self- and collective efficacy beliefs were examined as moderators of these relations.

The current study thus replicated Jex and Gudanowski (1992); however, we extended their investigation in three ways. First, somewhat different stressors were examined. The inclusion of task significance was a particularly useful extension because efficacy beliefs appear to have a strong effect on the degree to which employees desire responsibility and challenge in their jobs (Bandura, 1997). It is certainly plausible that individuals with low efficacy beliefs or groups with low levels of collective efficacy may not react as favorably to high levels of task significance as individuals with more positive efficacy beliefs or groups with high levels of collective efficacy. Stated differently, efficacy beliefs may largely determine whether task significance is perceived as a stressor.

Second, we extended the strain measures to include an index of employee health (physical symptoms). This is important because the health-related effects of stressors and other job conditions may have important consequences for both employers and employees (Matteson & Ivancevich, 1987). Also, given that low self-efficacy is apparently linked to anxiety (Jex & Gudanowski, 1992; Saks, 1994; Stumpf et al., 1987), it is possible that such anxiety, in the long term, may have deleterious effects on employee health.

Finally, in all analyses involving collective efficacy we used measures that were aggregated to a meaningful social unit (Army companies). This was deemed essential in light of the previous criticism of Jex and Gudanowski (1992). Performing these analyses at the aggregate level was more consistent with definitions of collective efficacy (e.g., Bandura, 1997; Guzzo et al., 1993; Riggs & Knight, 1994) and allowed a test of whether Jex and Gudanowski’s individual-level findings generalize to a more appropriate level of analysis. On the basis of our previous discussion, we viewed collective efficacy as an environmental variable that potentially moderated the relationship between individual-level stressors and individual-level strains. This approach explicitly models collective efficacy as a group-level contextual factor impacting the relationship between stressors and strains—a type of analysis that has been noticeably absent in health research (see Diez-Roux, 1998). In the organizational literature, this multilevel approach is referred to as a cross-level model (see Klein et al., 1994).

On the basis of the literature reviewed to this point, the following hypotheses were proposed:

**Hypothesis 1:** High levels of work overload and work hours and low levels of task significance will be associated with low levels of job satisfaction and organizational commitment, high levels of psychological strain, and higher numbers of reported physical symptoms.

**Hypothesis 2:** Low levels of self-efficacy will be associated with low levels of job satisfaction and organizational commitment, higher levels of psychological strain, and higher numbers of reported physical symptoms.

**Hypothesis 3:** Self-efficacy will moderate the impact of job stressors. Specifically, it was expected that work overload and work hours would be negatively related to strains only among those with low self-efficacy. In the case of task significance, it was expected that task significance would be more positively related to job satisfaction and organizational commitment among those with high levels of self-efficacy. In contrast, it was expected that task significance would be more positively related to psychological strain and physical symptoms among those with low self-efficacy.

**Hypothesis 4:** Groups with low levels of collective efficacy will have members who, on average, report low levels of job satisfaction and organizational commitment, higher levels of psychological strain, and higher numbers of reported physical symptoms.

**Hypothesis 5:** Group-level collective efficacy is a contextual variable that will moderate the relationship between job stressors and reports of strain. Specifically, it was expected that work overload and work hours would be negatively related to strains only in groups with low collective efficacy. In the case of task significance, it was expected that task significance would be more positively related to job satisfaction and organizational commitment in groups with high levels of collective efficacy. In contrast, it was expected that task significance would be more positively related to psychological strain and physical symptoms in groups with low collective efficacy.

Method

**Research Sample**

The data for this study were drawn from one wave of a longitudinal study of U.S. Army soldiers preparing for a training exercise. The sample consisted of completed responses from 2,273 members of one brigade combat team. Thirty-seven percent of the sample was married. Sixty-two percent of the sample was in the lower four enlisted ranks. The average age of the sample was 25 years old. Ninety-six percent of the sample was male. Ninety-nine percent of the sample had graduated from high school and/or had completed some degree of college. Fifty-four percent of the respondents were Hispanic; 24% were African American, and 12% were White. 24% were African American, and 12% were Hispanic.

The brigade combat team had approximately 3,000 individuals at the time of survey administration. Thus, we estimated the response rate to be approximately 76%. The 2,273 respondents were drawn from 36 companies. Eighty percent of the respondents...
had been in their companies for 6 months or longer. The average company size was approximately 64 respondents. The company level of analysis was selected for group-level analyses because performance is often assessed at the company level. Therefore, the collective efficacy items specifically directed individuals to rate their unit’s ability to accomplish its mission, and unit was defined as the company, battery, or troop (all company-level entities) to which the respondent belonged. In this article, we use the term company as a generic term for company, battery, or troop.

**Measures**

_**Stressors.**_ The three stressors studied were work overload, work hours, and task significance. Work hours were measured by the item “On average how many hours a day have you worked in the past week?” Individual work hour responses were influenced by company membership. This is reflected in the fact that the first intraclass correlation (ICC, 1; Bartko, 1976) for work hours was .05. Note that the ICC(1) has been called the ICC by Bryk and Raudenbush (1992). The ICC(2), a measure of group mean reliability, was .75. This value indicates reliable group mean differences in average work hours among groups. The ICC(2) is equivalent to the group-mean reliability measure discussed by Bryk and Raudenbush (1992).

Work overload was measured with a 3-item scale developed by Cammann, Fichman, Jenkins, and Klesh (1983). A sample item from this scale is “I have so much work to do, I cannot do everything well.” Respondents indicated agreement to each item (and items on most other scales) on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). Reliability for this scale, as measured by coefficient alpha, was estimated to be .65. This reliability was somewhat lower than what would be desired, but was deemed acceptable for a 3-item scale. The ICC(1) for work overload was .04 and the ICC(2) was .71.

Task significance was measured with three items developed from previous investigations of stress among military personnel (e.g., Halverson & Bliese, 1996). A sample item is “I feel that what I am doing is important for accomplishing my unit’s mission.” As a group, these three items were quite similar in content to the task significance scale from the Job Diagnostic Survey (JDS; Hackman & Oldham, 1975). Reliability for this scale was estimated to be .81. The ICC(1) was .02 and the ICC(2) was .59.

_**Strains.**_ Strains included job satisfaction, organizational commitment, a composite psychological strain index, and a composite physical strain index. Job satisfaction was measured with a three-item scale that was based on Hackman and Oldham (1975) but reworded for a military sample. A sample item is “I am very satisfied with my job in the Army.” Reliability for this scale was estimated to be .84. The ICC(1) was .02, and the ICC(2) was .60.

Organizational commitment was measured with a three-item scale that was based on Mowday, Porter, and Steers (1982), but was reworded for a military sample. A sample item is “I am really proud to tell others that I am part of the Army.” Reliability of this scale was estimated to be .81. The ICC(1) was .01, and the ICC(2) was .25.

Psychological strain was measured with the 53-item Global Severity Index (GSI; Derogatis, 1993; Derogatis & Melisaratos, 1983). This scale consists of nine subscales, although the total score was used in this study. The GSI is designed to serve as a general index of mental health in normal populations and has been used for this purpose in occupational stress research. It has also been used rather extensively as a measure of mental health in U.S. Army research (see Stuart & Halverson, 1997). The reliability for this scale was estimated to be .97. The ICC(1) was .00, and the ICC(2) was −.02.

Physical strain was measured with a scale developed for this study. This scale consisted of 24 health symptoms that were thought to be at least partially stress-related. Examples of these symptoms included headaches, back problems, and stomach intestinal upset. Respondents indicated the incidence of each symptom during the past month on a “yes–no” scale. A summation of the number of health symptoms experienced in the past month was used as a measure of physical strain. The ICC(1) was .00, and the ICC(2) was .14.

_**Efficacy beliefs.**_ Individual-level efficacy was measured with a modified five-item version of Jones’s (1986) efficacy scale. A sample item from this scale is “Based on my experiences, I am confident that I will be able to successfully perform my current job.” Respondents were asked to indicate agreement with each item with the same 5-point scale used for job stressors and work environment conditions. Reliability for this scale was estimated to be .70. The ICC(1) was .01, and the ICC(2) was .36. Collective efficacy was measured with a four-item scale developed for this study. A sample item from this scale is “I have real confidence in my unit’s ability to perform its mission.” These items were similar in content to other measures of collective efficacy. Respondents were asked to indicate agreement with each item on the same 5-point scale. Individual-level scale reliability for this scale was estimated to be .83. The ICC(1) was .06, and the ICC(2) was .80.

**Analysis Strategy**

Given (a) the degree of nonindependence among the variables of interest, and (b) the fact that we were interested in modeling main and interactive effects of collective efficacy (a group-level variable) on individual-level relationships, we analyzed the data using random coefficient models. Random coefficient models have been used since the 1950s in agriculture and animal breeding research (Longford, 1995) and have recently gained popularity as a means of examining grouped data in social science research (Bryk & Raudenbush, 1992). As a short conceptual overview, multilevel random coefficient models can be considered a simultaneous two-stage procedure. In Stage 1, intercepts and slopes are estimated for each group. The overall statistical significance of Level 1 (individual-level) relationships can be thought of as being based upon “polling” parameter and standard error estimates from across all groups.

In Stage 2, the variability of the Stage 1 slopes and intercepts provide a means of testing for Level 2 (i.e., group-level) effects. If a group-level variable (e.g., collective efficacy) is related to the variability of the intercept, it indicates that the group-level variable is directly related to the dependent variable. If a group-level variable is related to the variability of the slope, it provides evidence of cross-level moderation.

Three random coefficient models were estimated for each dependent variable. In the first model, Level 1 main effects between the stressors and the strain were estimated. This unconditional model provided tests for Hypotheses 1 and 2. In the second model,
both main effects and Level 1 interactions among self-efficacy, stressors, and strains were examined. This unconditional model provided tests for Hypothesis 3. In the third model, collective efficacy was entered as a Level 2 variable. The third model provided tests of Hypotheses 4 and 5. For brevity, parameter estimates and standard error estimates from each of the three models are listed in a single table. It is important to note, however, that parameter estimates and standard error estimates showed only minor variation across models.

In all analyses, Level 1 variables were group-mean centered, and Level 2 variables were grand-mean centered. This was done for two reasons. First, centering reduces multicollinearity and facilitates model estimation when main effects and interactive terms are both present (Bryk & Raudenbush, 1992). Second, group-mean centering of Level 1 variables is the recommended centering approach when Level 2 interactions are hypothesized (see Hoffmann & Gavin, 1998).

In a final set of analyses, a series of nested unconditional main effect models was estimated for each dependent variable. In the analyses, the “full” model contained a random effect for the slope, thus allowing slopes to randomly vary among groups. A second, “reduced,” model was then estimated in which the variance of the slope was constrained to be zero. Comparisons of likelihood ratio chi-squares between the full and reduced models provided a means of testing whether the Level 1 stressor–strain slopes significantly varied across groups. Specifically, these additional analyses helped us determine whether the data contained sufficient Level 2 slope variance to detect Level 2 moderation effects. Note that some random coefficient model programs test the significance of differences among slopes using covariance parameter estimates. However, the validity of tests based on covariance parameter estimates has been questioned (see Singer, in press), suggesting that comparisons of likelihood ratios may be a preferred method of testing for slope differences. All analyses were conducted using version 3.0 of the Linear Mixed Effects program for S-PLUS written by Pinheiro and Bates (1998).

Results

Correlational Results

Table 1 provides the individual-level correlations and summary statistics for the variables. For the sake of comparison, the individual-level correlation matrix also includes individuals’ reports of collective efficacy. Notice that there was a relatively modest level of intercorrelation among stressors and a fairly substantial intercorrelation among the four outcome measures. The strongest of these was between job satisfaction and organizational commitment ($r = .53$, $p < .05$). Self-efficacy and individuals’ reports of collective efficacy were moderately correlated ($r = .37, p < .05$). The correlations should be interpreted with caution given the known nonindependence among variables. Tests of the hypotheses are presented in four tables—one for each of the dependent variables.

Psychological Strain

Table 2 provides the random coefficient model results for psychological strain. The results from the table provide strong support for Hypotheses 1 and 2. In terms of Hypothesis 1, each of the stressors was significantly related to psychological strain in the anticipated direction. In support of Hypothesis 2, the table reveals that self-efficacy had a significant negative relationship with psychological strain. Table 2 also provides strong support for Hypothesis 3: Self-efficacy beliefs moderated the relationship between all three stressors and psychological strain. The individual-level effect size estimates for the self-efficacy interactions involving work hours, work overload, and task significance were 1.5%, 1.5%, and 0.4%, respectively. The effect size of 0.4% is particularly low, and is addressed in the Discussion.

Figure 1 presents the relationship between work hours and psychological strain as a function of self-efficacy. Notice that high self-efficacy (1 SD above the mean) was associated with a weaker relationship between work hours and psychological strain as predicted. Specifically, when self-efficacy was high, psychological strain was quite low even when work hours were high. Conversely, psychological strain was elevated when respondents with low self-
efficacy (1 SD below the mean) reported working long hours. Figure 2 illustrates the same pattern for the relationship between work overload and psychological strain, and Figure 3 shows a similar pattern for the relationship between task significance and psychological strain.

Results of analyses examining the main effects of collective efficacy (Hypothesis 4) and the moderating effects of collective efficacy (Hypothesis 5) are presented in the lower portion of Table 2. Notice that collective efficacy was significantly related to the average levels of psychological strain. This provides support for Hypothesis 4. The results presented in Table 2 provide no evidence to support the hypothesis that collective efficacy moderates the relationship between individual stressors and psychological strain (Hypothesis 5), despite the fact that tests for variation in slopes revealed significant variation among groups in the work hours–psychological strain slope (likelihood ratio of 7.549, \( p < .05 \)).

**Physical Symptoms**

Table 3 presents the results from models predicting physical symptoms. In terms of Hypothesis 1, notice that work hours and work overload were significantly related to the number of physical symptoms reported by individuals; however, perceptions of task significance were unrelated to reports of physical symptoms. Thus, Hypothesis 1 was partially supported. As predicted in Hypothesis 2, self-efficacy was negatively related to the number of physical symptoms. Partial support for Hypothesis 3 was also found because self-efficacy and work overload showed a significant interaction in their relation to physical symptoms. This interaction accounted for 0.4% of the individual-level variance. Figure 4 reveals that work overload was positively...

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**Table 2**

*Random Coefficient Models Predicting Psychological Strain*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter estimate</th>
<th>SE</th>
<th>Z ratio</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.406</td>
<td>0.015</td>
<td>27.911</td>
<td>.000</td>
</tr>
<tr>
<td>Work hours</td>
<td>0.023</td>
<td>0.006</td>
<td>3.800</td>
<td>.000</td>
</tr>
<tr>
<td>Work overload</td>
<td>0.096</td>
<td>0.018</td>
<td>5.193</td>
<td>.000</td>
</tr>
<tr>
<td>Task significance</td>
<td>-0.068</td>
<td>0.026</td>
<td>-2.661</td>
<td>.008</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>-0.143</td>
<td>0.025</td>
<td>-5.771</td>
<td>.000</td>
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<tr>
<td>Level 1 unconditional interaction model</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours × Efficacy</td>
<td>-0.028</td>
<td>0.007</td>
<td>-4.346</td>
<td>.000</td>
</tr>
<tr>
<td>Work Overload × Efficacy</td>
<td>-0.124</td>
<td>0.026</td>
<td>-4.767</td>
<td>.000</td>
</tr>
<tr>
<td>Task Significance × Efficacy</td>
<td>0.047</td>
<td>0.018</td>
<td>2.528</td>
<td>.11</td>
</tr>
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<td>Level 2 model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collective efficacy (intercept)</td>
<td>-0.163</td>
<td>0.056</td>
<td>-2.889</td>
<td>.004</td>
</tr>
<tr>
<td>Hours × Collective Efficacy (slope)</td>
<td>0.001</td>
<td>0.025</td>
<td>0.059</td>
<td>0.953</td>
</tr>
<tr>
<td>Work Overload × Collective Efficacy (slope)</td>
<td>-0.101</td>
<td>0.077</td>
<td>-1.306</td>
<td>.242</td>
</tr>
<tr>
<td>Task Significance × Collective Efficacy (slope)</td>
<td>0.042</td>
<td>0.007</td>
<td>4.89</td>
<td>.624</td>
</tr>
</tbody>
</table>

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**Figure 1.** Plot of the interaction between work hours and self-efficacy in predicting psychological strain.

**Figure 2.** Plot of the interaction between work overload and self-efficacy in predicting psychological strain.
related to reports of physical symptoms only among individuals with low efficacy. The results from Table 3 provide no evidence to support the hypothesis that collective efficacy is directly related to average levels of physical symptoms in groups (Hypothesis 4), nor that it moderates the relationship between individual stressors and psychological strain (Hypothesis 5). Subsequent tests revealed that the work hours and psychological strain slope had significant variability (likelihood ratio of 8.680, \( p < .05 \)), but that the other slopes did not significantly vary among groups.

**Job Satisfaction**

Table 4 presents the results from the random coefficient models predicting job satisfaction. Hypothesis 1 was supported in terms of work overload and task significance, but not in terms of work hours. Hypothesis 2 was supported, with self-efficacy demonstrating a strong positive relationship to job satisfaction. Hypothesis 3 received no support, as none of the interactions among self-efficacy, the stressors, and job satisfaction were significant.

Notice that collective efficacy was significantly related to average levels of job satisfaction (supporting Hypothesis 4), and that it also showed evidence of significant contextual effects in terms of the work overload and job satisfaction slope, thus lending partial support to Hypothesis 5. Effect size estimates indicated that collective efficacy explained 33% of the random variation in the workload–job satisfaction slope. Figure 5 presents the form of the interaction. Notice that job satisfaction remained relatively high when individuals were in units with high collective efficacy regardless of the level of work overload. When collective efficacy was low, in contrast, job satisfaction decreased as work overload increased. Tests for variation in slopes revealed significant variation among groups only in the work

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter estimate</th>
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<th>Z ratio</th>
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<tr>
<td>Intercept</td>
<td>6.847</td>
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<td>Work hours</td>
<td>0.157</td>
<td>0.067</td>
<td>2.353</td>
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<td>Work overload</td>
<td>0.834</td>
<td>0.205</td>
<td>4.059</td>
<td>.000</td>
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<td>Task significance</td>
<td>0.202</td>
<td>0.293</td>
<td>0.690</td>
<td>.490</td>
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<td>Self-efficacy</td>
<td>-0.566</td>
<td>0.284</td>
<td>-1.993</td>
<td>.046</td>
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<tr>
<td>Hours ( \times ) Efficacy</td>
<td>0.023</td>
<td>0.076</td>
<td>0.303</td>
<td>.762</td>
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<tr>
<td>Work Overload ( \times ) Efficacy</td>
<td>-0.688</td>
<td>0.309</td>
<td>-2.228</td>
<td>.026</td>
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<td>Task Significance ( \times ) Efficacy</td>
<td>-0.035</td>
<td>0.228</td>
<td>-0.154</td>
<td>.878</td>
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<tr>
<td>Collective efficacy (intercept)</td>
<td>-1.193</td>
<td>0.654</td>
<td>-1.826</td>
<td>.068</td>
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<tr>
<td>Hours ( \times ) Collective Efficacy (slope)</td>
<td>0.291</td>
<td>0.291</td>
<td>1.000</td>
<td>.317</td>
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<tr>
<td>Work Overload ( \times ) Collective Efficacy (slope)</td>
<td>-0.777</td>
<td>0.952</td>
<td>-0.816</td>
<td>.414</td>
</tr>
<tr>
<td>Task Significance ( \times ) Collective Efficacy (slope)</td>
<td>0.369</td>
<td>1.127</td>
<td>0.328</td>
<td>.743</td>
</tr>
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</table>
Table 4

Random Coefficient Models Predicting Job Satisfaction

<table>
<thead>
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<th>Variable</th>
<th>Parameter estimate</th>
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<td>Work hours</td>
<td>0.003</td>
<td>0.006</td>
<td>0.551</td>
<td>.582</td>
</tr>
<tr>
<td>Work overload</td>
<td>-0.191</td>
<td>0.030</td>
<td>-6.294</td>
<td>.000</td>
</tr>
<tr>
<td>Task significance</td>
<td>0.429</td>
<td>0.031</td>
<td>13.906</td>
<td>.000</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.492</td>
<td>0.035</td>
<td>13.895</td>
<td>.000</td>
</tr>
</tbody>
</table>

Level 1 unconditional interaction model
- Hours X Efficacy: -0.005, SE = 0.009, Z ratio = -0.538, p = 0.591
- Work Overload X Efficacy: -0.020, SE = 0.038, Z ratio = -0.530, p = 0.596
- Task Significance X Efficacy: 0.049, SE = 0.027, Z ratio = 1.801, p = 0.072

Level 2 model
- Collective efficacy (intercept): 0.518, SE = 0.104, Z ratio = 4.965, p = 0.000
- Hours X Collective Efficacy (slope): -0.041, SE = 0.028, Z ratio = -1.443, p = 0.149
- Work Overload X Collective Efficacy (slope): 0.255, SE = 0.124, Z ratio = 2.047, p = 0.041
- Task Significance X Collective Efficacy (slope): 0.040, SE = 0.112, Z ratio = 0.353, p = 0.724

Table 5 also provides support for Hypotheses 4 and 5. In support of Hypothesis 4, collective efficacy was found to be significantly related to average levels of organizational commitment. Hypothesis 5 was supported in the significant relationship between collective efficacy and the task significance-organizational commitment slope. The interaction was estimated to explain 93% of the variance in the slopes among groups. Figure 7 shows the form of this interaction. The figure shows that, as predicted, when collective efficacy was high, the relationship between task significance and job commitment was stronger than when collective efficacy was low. Interestingly, tests for significant slope variation indicated that none of the stressor-commitment slopes significantly varied across groups, including the task significance and organizational commitment slope (likelihood ratio of 0.525, ns).

**Organizational Commitment**

Table 5 presents the random coefficient model results examining organizational commitment as an outcome. Hypothesis 1 was supported for work overload and task significance, but not for work hours. Hypothesis 2 was supported with a significant positive relationship between levels of self-efficacy and organizational commitment. Hypothesis 3 received partial support, with a significant relationship between self-efficacy and work overload. The interaction explained only 0.09% of the individual-level variance. Figure 6 reveals that commitment remained relatively high for individuals with high self-efficacy even under conditions where work overload was high. Despite the weak form of the interaction, it supports Hypothesis 3.

**Discussion**

This study was designed to examine the moderating effect of efficacy beliefs (individual and collective) on relations between work-related stressors and both psychological and physical strains. Thus, it was a replication of Jex and Gudanowski (1992) but improved on that investigation in two key respects. First, the sample size in the present study was much larger, thus allowing for adequate statistical power to detect moderator effects (Aguinis & Stone-Romero, 1997). Second, analyses examining the moderating effects of collective efficacy were based on group-level data and thus used analyses that were more congruent with the level of theory.

The decision to analyze collective efficacy as a group-level construct was based on theoretical grounds (see Guzzo et al., 1993) and not on the ratio of between- and within-
Table 5  
Random Coefficient Models Predicting Organizational Commitment

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter estimate</th>
<th>SE</th>
<th>Z ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 unconditional main effect model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.526</td>
<td>0.022</td>
<td>140.623</td>
<td>.000</td>
</tr>
<tr>
<td>Work hours</td>
<td>0.009</td>
<td>0.006</td>
<td>1.472</td>
<td>.141</td>
</tr>
<tr>
<td>Work overload</td>
<td>-0.143</td>
<td>0.025</td>
<td>-5.620</td>
<td>.000</td>
</tr>
<tr>
<td>Task significance</td>
<td>0.447</td>
<td>0.029</td>
<td>15.210</td>
<td>.000</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.329</td>
<td>0.034</td>
<td>9.697</td>
<td>.000</td>
</tr>
<tr>
<td>Level 1 unconditional interaction model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours X Efficacy</td>
<td>0.003</td>
<td>0.009</td>
<td>0.314</td>
<td>.753</td>
</tr>
<tr>
<td>Work Overload X Efficacy</td>
<td>0.073</td>
<td>0.036</td>
<td>2.020</td>
<td>.043</td>
</tr>
<tr>
<td>Task Significance X Efficacy</td>
<td>-0.048</td>
<td>0.026</td>
<td>-1.839</td>
<td>.066</td>
</tr>
<tr>
<td>Level 2 model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collective Efficacy (intercept)</td>
<td>0.255</td>
<td>0.085</td>
<td>3.010</td>
<td>.003</td>
</tr>
<tr>
<td>Hours X Collective Efficacy (slope)</td>
<td>0.001</td>
<td>0.028</td>
<td>0.039</td>
<td>.969</td>
</tr>
<tr>
<td>Work Overload X Collective Efficacy (slope)</td>
<td>0.145</td>
<td>0.111</td>
<td>1.305</td>
<td>.192</td>
</tr>
<tr>
<td>Task Significance X Collective Efficacy (slope)</td>
<td>0.242</td>
<td>0.108</td>
<td>2.248</td>
<td>.025</td>
</tr>
</tbody>
</table>

Nonetheless, the group-level properties of our particular research sample supported the theoretical distinction between collective and self-efficacy. Specifically, the ICC(2) value for collective efficacy was higher than the ICC(2) for any other variables in the study and it was substantially higher than the ICC(2) for self-efficacy. This indicates that individuals’ reports of collective efficacy were more highly influenced by group membership than individuals’ reports of self-efficacy. This finding is congruent with the theoretical distinction between the two constructs.

The results of this study, like those from Jex and Gudanowski (1992), suggest that efficacy is an important variable in the study of occupational stress. Both self- and collective efficacy were related to strains. Specifically, low levels of self-efficacy were associated with high levels of psychological strain and high levels of physical strain, as well as with low levels of job satisfaction and organizational commitment. At the group level, collective efficacy was significantly related to average levels of psychological strain, job satisfaction, and commitment. These relations clearly suggest that employees may react negatively when they perceive that they, or their work groups, are not capable of high levels of performance. Of course the possibility cannot be ruled out that high levels of strain have a negative impact on both individual and collective efficacy beliefs.

Results from analyses examining the moderating effects of both individual and collective efficacy showed that both variables had some impact on stressor–strain relations. Specifically, self-efficacy moderated the relationship between work hours and psychological strain, work overload and psychological strain, task significance and psychological strain, work overload and physical symptoms, and work overload and organizational commitment. Collective efficacy moderated the relationship between work overload and job satisfaction, and between task significance and organizational commitment. In all cases, respondents who reported low levels of efficacy reacted more negatively to stressors or (in the case of task significance and commitment) reacted less favorably to positive environments than respondents who reported high levels of efficacy.

Compared to the Jex and Gudanowski (1992) study

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1 Chan (1998) has provided a valuable typology for describing the rationale underlying aggregation decisions. We consider collective efficacy to be a summation of individual perceptions regardless of the variance among units. This makes collective efficacy an example of an additive model in Chan’s typology. However, because collective efficacy is assessed from individuals who rate a group attribute, it also represents a referent-shift model in Chan’s typology. Thus, our treatment of collective efficacy is most accurately described as an example of an additive referent-shift model. Note that collective efficacy could also be conceptualized as a referent-shift consensus model (see Chan, 1998).
where self-efficacy had no moderating effects, results of the present study suggest that high levels of self-efficacy may indeed help employees cope more effectively with stressors. Specifically, the present results showed that individuals with high levels of self-efficacy might not react as negatively to work overload as those with low self-efficacy. Such individuals may also react more favorably to jobs with high task significance. These findings are congruent with what is known about self-efficacy (Bandura, 1997). An employee who perceives himself or herself to be competent, or who has high self-efficacy, is probably not as likely to view a stressor as being threatening as is an individual with low self-efficacy. This is likely to occur because individuals with high levels of self-efficacy are also likely to have developed more effective ways of coping with stressors than those with low levels of self-efficacy.

The fact that Jex and Gudanowski (1992) failed to find moderator effects for self-efficacy may possibly be due to two factors. First, their failure to detect more evidence of moderator effects may have simply been due to low statistical power (Aguinis & Stone-Romero, 1997). As indicated earlier, several interactions in their study accounted for between 1 and 2% of the variance in the model, but were not statistically significant. Recall that the effect sizes for the interaction terms in the current study consistently accounted for less than 2% of the variance; however, these interactions were statistically significant given the large sample sizes used in the current study. A second possibility, however, is simply that self-efficacy may be more likely to impact some of the stressors in the present study, compared to those examined by Jex and Gudanowski. Although Jex and Gudanowski also examined workload (measured by hours), their study did not examine perceived work overload or task significance.

The relatively weak evidence for moderating effects as-


Figure 7. Plot of the interaction between task significance and collective efficacy in predicting organizational commitment.
Modeling contextual effects may also have considerable practical significance in occupational stress research and practice. This is because the presence or absence of contextual effects has important implications for designing and implementing interventions (Schwartz, 1994). In cases where stressors and strains do not cluster by group, individual-based intervention strategies may be the most effective means of reducing work stress. For example, in cases where stressors and strains do not cluster by group, one may work to identify individuals having particularly high levels of psychological strain and teach them more effective coping strategies. This strategy could be implemented without any particular attention to the individuals’ group membership.

In contrast, when stressors and strains cluster by group, this indicates that there is some aspect of the environment distinct from the attributes of the individuals that is related to the outcome (Schwartz, 1994). In these cases, intervention strategies may be most effective if directed at groups (Bliese & Halverson, 1996). For example, one may want to reduce the work overload in a work team whose members report high levels of strain. In this instance, it would also be important to estimate the impact of the group-level intervention using results from group-level data. Using results from individual-level data to estimate the impact of a group-level intervention on group-level outcomes would constitute committing an “atomistic” fallacy—a fallacy analogous to the more common “ecological” fallacy of using group-level results to draw individual-level inferences (Diez-Roux, 1998). It is important to match the level of inference with the level of analysis because even small degrees of non-independence can result in large differences between individual and group-level relationships (Bliese, 1998; Ostroff, 1993). Thus, attention to the group-level properties of stressors and strains is important in designing and implementing interventions.

**Study Limitations**

In considering the results of this study, three limitations must be mentioned. First, the effect sizes associated with the interaction terms were quite small. This raises the question of whether these effects actually had any practical significance. According to Evans (1985), even moderator effects that explain a very small portion of the variance in a dependent measure may be meaningful. One simple way to estimate the meaningfulness of the interactions is to examine the interaction plots. Notice that in all of the plots involving psychological strain (see Figures 1–3), the scale ranged from 0 to .80. Derogatis (1993) stated that the adult male nonpatient norm for the psychological strain measure (the GSI) is .18, whereas the adult male psychiatric inpatient norm is between .74 and .78. If one compares the current sample to these norms, one can argue that a value of .80 represents significant psychological distress. In this case, we believe that the interactions are quite meaningful even though the effect sizes were small. We also believe that the small effect sizes for the interaction involving physical health symptoms appear to have practical utility because the difference between high and low self-efficacy under conditions of high work overload translates into a difference of about one-and-a-half fewer health symptoms. It is more difficult to estimate the practical utility of the interactions involving job satisfaction and commitment. Notice that the same scale ranges were used for all figures involving job satisfaction and organizational commitment to facilitate visual comparisons. An examination of the plots suggests that the interaction between self-efficacy and work overload in predicting organizational commitment may lack practical significance, and may be an instance where the large sample size allowed us to detect a significant, yet trivial interaction.

A second limitation is the fact that all data in this study were collected by means of self-report measures. This, of course, raises the possibility that the findings may have been impacted by common method variance (Spector, 1987). Although this possibility cannot be denied, it can also be argued that it is unlikely that the moderator effects were due to such a methodological artifact. Furthermore, common method variance cannot explain why certain variables exhibit evidence of group-level properties while others do not. Nevertheless, in future investigations of self-efficacy and occupational stress, it would be useful to supplement self-report measures with other measures (e.g., archival data) of both stressors and outcomes.

A final limitation of this study is the fact that the sample consisted entirely of military personnel. This obviously raises concerns about the generalizability of the findings to nonmilitary work settings. Such concerns, however, are tempered by the fact that the findings are consistent with self-efficacy theory (Bandura, 1997), and generally are in accord with other studies that have employed nonmilitary samples (Jex & Gudanowski, 1992; Saks, 1994). In the future, however, it would be useful to replicate these findings in other nonmilitary settings.

**Practical Implications and Future Research**

Two major practical implications can be gleaned from the present findings. The first implication is that stressful work conditions are associated with poor psychological and physical health among employees (Matteson & Ivancevich, 1987). On the basis of these results, we argue that it is

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2 As another referent, psychological strain was assessed in a large sample of soldiers deployed to the Persian Gulf in January 1991. These respondents were on the verge of entering a combat environment, yet their strain scores were lower than .80 (see Stuart & Halverson, 1997).
certainly in an organization’s best interest to keep stressors to manageable levels. In situations where stressors are inevitable, it may be helpful for organizations to foster a strong sense of efficacy among both individuals and groups. This seems especially true for groups that must periodically cope with periods of very heavy workloads (e.g., groups regularly faced with impending deadlines). At the individual level, this may be done through training, goal setting, and on-the-job coaching (Bandura, 1997). In the case of groups, efficacy may be boosted through goal setting, rewards, and the provision of adequate resources (Guzzo & Shea, 1992). This point may seem contradictory given the above recommendation regarding the reduction of stressors; however, in some cases, stressors may be unavoidable. As an example, public accounting firms face a drastic increase in workload during tax season. Also, given the nature of military service, soldiers may be cast into stressful situations despite organizational efforts to reduce stressors. If individuals and groups have a strong sense of efficacy, they may be better able to cope effectively with such stressors.

Future research should be aimed at the further examination of the role of collective efficacy in occupational stress. There may be value, for example, in examining collective efficacy as a contextual variable in smaller groups. In the current study, a lower level of aggregation (e.g., platoon or squad) was not selected because respondents had been explicitly instructed to rate the levels of collective efficacy in their companies, batteries, or troops (all company equivalents). Thus, it would be conceptually confounding to use the collective efficacy measures as indices of lower level group properties with this data. Yet it seems worth examining whether the effects of collective efficacy would be more pronounced in smaller work groups where group member interaction is stronger.

Investigations must also go beyond simply documenting relations between efficacy beliefs and stress-related variables, or even demonstrating moderator effects. Instead, future research is needed to provide insight into why efficacy beliefs impact the stress process. As has been suggested in this article, individual-level efficacy may impact stress through the success of coping efforts and collective efficacy may serve to enhance social support. No occupational stress research, to date, has examined these propositions in depth.

References


Efficacy Beliefs and Stress


