

# An Examination of the Antecedents and Moderator Influences of Climate Strength

Vicente González-Romá, José M. Peiró, and Núria Tordera  
University of Valencia

The authors tested 3 hypotheses regarding the antecedents and moderator influences of climate strength (CS; the degree of within-unit agreement of climate perceptions). The sample consisted of 197 work units. Social interaction among unit members showed positive, statistically significant correlations with CS in goals orientation and innovation climate. Work-unit leaders' informing behavior was positively correlated with CS in the 3 climate facets measured (i.e., support, goals orientation, and innovation). CS in innovation moderated the impact of work units' innovation climate on average satisfaction and commitment. CS in goals orientation moderated the influence of work units' goal orientation on average commitment. The moderator influences showed the expected direction: CS fostered the influence of work units' climate on the criterion variables.

In the present study, we test a number of hypotheses regarding the antecedents and moderator influences of *climate strength* (the degree of within-unit agreement among unit members' climate perceptions). This construct has received little attention from organizational climate researchers (Brown & Kozlowski, 1999; Klein, Conn, Smith, & Sorra, 2001). In the remainder of the introduction, we first explain why climate strength has been unattended as a scientific construct and point out two conceptual contributions that have added to the consideration of climate strength in climate research. Then we provide theoretical justification for the three hypotheses tested.

## Climate Strength, an Unattended Scientific Construct

Multilevel researchers often gather and aggregate individual-level data to operationalize higher level constructs. For instance, employees' scores on climate scales are aggregated to operationalize group, work team, department, and organizational climate (e.g., West, Smith, Feng, & Lawthom, 1998). For the development of these higher level constructs, a composition model is needed (James, 1982; Rousseau, 1985). Composition models specify the functional relationships among constructs operationalized at different levels of analysis (Chan, 1998; James, 1982). In the case of climate, for instance, composition models specify how individuals' psychological climate is related to work team or organizational

climate. Chan (1998) proposed a typology of five composition models. The direct consensus model is the one most frequently used in climate research. "This model uses within-group consensus of the lower level units as the functional relationship to specify how the construct conceptualized and operationalized at the lower level is functionally isomorphic to another form of the construct at the higher level" (Chan, 1998, p. 237). In this model, within-group agreement in climate perceptions (i.e., climate strength) is used to justify aggregation of lower level scores to represent scores at the higher level. Thus, in these models within-group agreement is a prerequisite for arguing that a higher level construct can be operationalized and that it exists. In climate research, one first computes agreement among unit members' scores (i.e., climate strength) to assess whether the within-unit agreement condition is met and whether the unit climate construct is tenable. The use of the within-unit agreement criterion as a prerequisite in the direct consensus models has hidden the status of climate strength as a scientific construct.

Two recent conceptual contributions have helped researchers to view climate strength as a scientific construct. In Chan's (1998) typology of composition models, there is a class of models in which within-unit agreement is not a prerequisite for aggregation but rather a focal construct. This is a dispersion model. Dispersion (or its opposite, within-unit agreement) is, by definition, a unit-level characteristic. In dispersion models, within-unit agreement is used as the operationalization of a unit-level construct (Chan, 1998). Dispersion constructs are relatively rare within the organizational literature (Brown & Kozlowski, 1999; Klein et al., 2001), but a few examples can be found, such as climate strength (Brown & Kozlowski, 1999; Chan, 1998; Lindell & Brandt, 2000; Salvaggio, Schneider, & Subirats, 2000), norm crystallization (the degree of within-unit consensus regarding what is appropriate or inappropriate behavior; Jackson, 1975), and demographic heterogeneity (the degree of within-unit variability regarding unit members' demographic characteristics; Chatman, Polzer, Barsade, & Neale, 1999).

Within-unit agreement is also a focal construct in Brown and Kozlowski's (1999) dispersion theory (DT). This theory has been

---

Vicente González-Romá, Department of Methodology of Behavioral Sciences, University of Valencia, Valencia, Spain; José M. Peiró and Núria Tordera, Department of Social Psychology, University of Valencia.

This study was partially supported by Research Grant PB94-0997 from Dirección General Interministerial de Ciencia y Tecnología. We thank Steve Kozlowski, Wilmar Schaufeli, Bram Buunk, and Michael West for their helpful comments on versions of this article and Fernando Prieto for his everlasting inspiration and encouragement.

Correspondence concerning this article should be addressed to Vicente González-Romá, University of Valencia, Faculty of Psychology, Department of Methodology of Behavioral Sciences, Avenida Blasco Ibáñez, 21, 46010 Valencia, Spain. E-mail: vicente.glez-roma@uv.es

offered as an initial effort to move beyond the dichotomous view of emergence of higher level constructs fostered by the direct consensus model of composition (Brown & Kozlowski, 1999). This theory recognizes that individual-level constructs (e.g., psychological climate) combine through social interaction processes to emerge as unit-level phenomena (e.g., work team climate). In DT, within-unit agreement is used as a measure of the degree of emergence of higher level constructs, and it is assumed that “units can be characterized by the extent to which a phenomenon has emerged as a meaningful unit characteristic” (Brown and Kozlowski, 1999, p. 6). In this context, climate strength is an indicator of the degree of emergence of work units’ climate.

Despite these two recent conceptual contributions, the empirical research on climate strength is still scarce (Klein et al., 2001; Lindell & Brandt, 2000). The aim of the present article is to examine some of the possible antecedents and moderator influences of climate strength.

### Antecedents of Climate Strength

Some theoretical frameworks and recent empirical findings can be used to formulate hypotheses on the antecedents of climate strength. The interactive approach to climate formation posits that shared perceptions of the work environment evolve from the interactions of unit members (Moran & Volkwein, 1992; Schneider & Reichers, 1983). From this perspective, it is through social interactions that unit members communicate and discuss their attributed meanings to work environment events and develop a shared interpretation of their setting (Ashforth, 1985). This theoretical approach has received empirical support from Rentsch’s (1990) study. Rentsch defined existing interaction groups within an organization using sociometric methods and showed that employees involved in the same interaction groups attributed similar meanings to organizational events, whereas employees involved in different interaction clusters attributed different meanings to these events. Klein et al. (2001) obtained significant positive correlations between social interaction among unit members and climate strength in three climate dimensions. González-Romá, Ramos, Peiró, Rodríguez, and Muñoz (1994) found in a sample of primary health care teams a significant positive correlation between an indicator of work team members’ social interaction (the frequency in which cases were tackled in collaboration among team members) and climate strength in innovation climate. Thus, we hypothesize the following:

*Hypothesis 1:* The greater the social interaction is among unit members, the greater the climate strength is.

Unit leaders can play a crucial role in climate formation (Schein, 1985; Kozlowski & Doherty, 1989). This influence has been acknowledged by pioneer leadership researchers (Blake & Mouton, 1968; Lewin, 1951; Likert, 1967; McGregor, 1960). Empirical research has confirmed this general proposition. For example, Kozlowski and Doherty’s (1989) study showed that the quality of leader–member relationships contributes to shaping members’ climate perceptions. These researchers found that their subsample of work-unit members with high-quality relationships with their supervisor tended to exhibit greater consensus on a number of organizational climate dimensions than did the subsample of work-unit members with low-quality supervisor relationships. This result

suggests that leader–member interaction may be a potential determinant of within-unit consensus regarding climate perceptions (i.e., climate strength). In these interactions, leaders may inform unit members about new practices and strategies, the goals to be reached, the work to be carried out, and other work-unit-related issues. Considering that leaders may serve as interpretive filters of relevant work-unit events, features, and processes (Kozlowski & Doherty, 1989), it is reasonable to expect that leaders, by means of this informing behavior (Yukl & Van Fleet, 1992), will try to shape unit members’ perceptions of the unit, promoting within-unit consensus regarding unit perception. Thus, we hypothesize the following:

*Hypothesis 2:* The greater the unit leader’s informing behavior is, the greater the climate strength is.

### Moderator Influence of Climate Strength

The relationship between different facets of climate perceptions and affective responses, such as work satisfaction and organizational commitment, has been documented in the literature at the individual level of analysis (e.g., Pritchard & Karasick, 1973; Repetti & Cosmas, 1991), at the work team level of analysis (e.g., Lindell & Brandt, 2000; González-Romá, Peiró, Subirats, & Mañas, 2000), and across levels (e.g., Ostroff, 1993). In the present study, we consider three important facets of climate (Kopelman, Brief, & Guzzo, 1990; Koys & DeCotiis, 1991): support (the extent to which there are kindly and supportive relationships among unit members), innovation (the extent to which there is openness to new ideas and to which these are implemented), and goals orientation (the extent to which goals are clearly defined and their achievement is evaluated and stressed). The positive relationship between support and satisfaction is based on the fact that supportive behaviors demonstrate to individuals that their personal and work-related problems are of concern to their colleagues and supervisors (Kopelman et al., 1990). Supportive relationships among employees can promote organizational commitment because employees can feel a sense of belonging that contributes to fulfilling their affiliation and social needs (O’Reilly & Chatman, 1986; Ostroff & Bowen, 2000). The positive relationship between the facet of innovation and satisfaction and commitment is rooted in the fact that a climate of innovation encourages the use of employees’ skills (Ostroff & Bowen, 2000). This use of skills promotes personal and professional growth, which in turn enhances work satisfaction and commitment to the unit that makes this growth possible. With regard to goals orientation, the perception of clear goals is a prerequisite for employees’ self-evaluation and, if goals are attained, satisfaction (Bandura, 1986; Kopelman et al., 1990). Moreover, units in which goals are clearly perceived and their achievement is stressed stimulate employees’ psychological attachment to unit goals, thus increasing employees’ commitment.

At the work-unit level of analysis, the relationship between climate and affective responses has been empirically supported (Bliese & Halverson, 1998; González-Romá et al., 2000; Lindell & Brandt, 2000). For example, in a two-wave panel study, González-Romá et al. (2000) showed that changes over time in units’ aggregate scores on the climate facets of support, innovation, and goals orientation predicted changes over time in units’ aggregate

satisfaction. These results support the idea that shared climate perceptions shape collective affective responses (Ostroff & Bowen, 2000). Furthermore, and considering that even work units with the same aggregate score on a climate facet can differ in extent of within-unit agreement in climate perceptions, different authors have stressed that climate strength must be accounted for in studying the relationships between work units' climate and work units' outcomes (Brown & Kozlowski, 1999; Ostroff & Bowen, 2000). However, the moderator influence of climate strength has rarely been examined in previous research.

Bliese and Halverson (1998), in a sample of U.S. Army companies, studied whether climate strength had a direct impact on units' average psychological well-being. They posited that low within-unit consensus regarding climate perceptions (i.e., low climate strength) leads to stressful work environments, which, in turn, contribute to poor psychological well-being among group members. However, they could not test this causal ordering, as they did not measure the second construct. They also tested for possible interactions between units' average climate scores and climate strength, although they did not make specific a priori hypotheses about these interactions. Bliese and Halverson (1998) found that, after they controlled for units' average climate scores, climate strength showed a significant impact on units' average psychological well-being, so that the greater the climate strength was in leadership climate and peer relations climate, the greater was the unit members' average well-being. However, they also found that the interaction between units' average climate scores and climate strength did not predict units' average psychological well-being.

Using a sample of local emergency planning committees (LEPCs), Lindell and Brandt (2000) tested a number of hypotheses regarding the influence of units' average climate (what they called *climate quality*), climate strength (*climate consensus*, in their words), and their interaction on aggregate affective and attitudinal responses (e.g., job satisfaction, citizenship, turnover intention). The interaction hypothesis was based on a mixture of methodological and substantive arguments. The authors argued that minimum within-unit agreement yields the same unit's aggregate climate score as does maximum consensus on a moderate climate score, because both conditions yield average ratings of 3 on a 5-point scale. They stated that

one would expect a minimum-consensus climate to produce more negative outcomes than a high-consensus-moderate-quality climate because of interpersonal friction, conflict, and process losses. This reasoning suggests climate consensus has a positive main effect and also moderates the effect of climate quality on individual and organizational outcomes. (Lindell & Brandt, 2000, p. 337)

Their results show that neither climate strength nor its interaction with units' average climate added unique variance to the prediction of aggregate affective and attitudinal responses once the influence of units' average climate had been controlled.

Salvaggio et al. (2000), in a sample of boundary bank employees, examined whether climate strength moderated the impact of units' service climate on customer perceptions of service quality. They argued that when climate strength is high, employees may provide a "united front" to customers, "making the customers' experience of service quality more consistent over time and across employees" (p. 6). They posited that when climate for service is

high, and there is a high climate strength, customer perceptions of service quality should be higher than when climate strength is low, because under strong climate conditions customers are experiencing more consistent service. Salvaggio et al. (2000) found that for one of the four climate measures they used (the Managerial Practices Climate Scale), climate strength moderated the impact of units' score on the scale on four out of the five scales of customer perceptions of service quality that they used, so that the relationship between units' climate and customer perceptions disappeared when climate strength was low. Salvaggio and colleagues' (2000) results suggest that high climate strength may foster the impact of units' climate on units' outcome variables.

As we can see, the few studies in which the moderator influence of climate strength has been investigated have yielded contradictory and inconclusive results. In the present article, we posit that the influence of units' aggregate climate on units' aggregate satisfaction and aggregate commitment is moderated by climate strength. Mischel (1973) proposed the term *situational strength* to refer to the degree of ambiguity present in the context (see also Ostroff & Bowen, 2000). In weak situations, employees experience a high degree of ambiguity regarding what the appropriate responses are; thus, variability of responses is large. In strong situations, however, individuals interpret events in a similar way, and this promotes uniform expectations about appropriate responses, so that variability on those responses is small (Mischel, 1973; Ostroff & Bowen, 2000). Similarly, we argue that strong climates (i.e., climates with high within-unit agreement in which individuals interpret events in the same way) foster uniform and consistent affective responses, whereas under weak climate conditions the variability of associated affective responses is larger. This affects the predictability of those affective responses, so that they are more predictable in strong climate conditions than in weak ones (Lindell & Brandt, 2000). Thus, on the basis of this rationale, we hypothesize the following:

*Hypothesis 3:* Climate strength moderates the relationship between units' score on climate scales and units' aggregate work satisfaction and organizational commitment, so that when climate strength is high, the influence of units' climate on units' work satisfaction and organizational commitment is high, and when climate strength is low, the aforementioned influence is weakened.

In summary, in this study we examine a number of hypotheses regarding possible antecedents of climate strength and its moderator influence on the relationship between work-unit climate and work-unit satisfaction and organizational commitment. As some researchers have pointed out, empirical research on this topic is still scarce (Bliese & Halverson, 1998; Brown & Kozlowski, 1999; Klein et al., 2001; Lindell & Brandt, 2000), and new efforts are needed to reach a better understanding of the role of climate strength in work-unit processes. Our study extends previous investigations by examining new hypothetical antecedents (leaders' informing behavior) and new criterion variables (organizational commitment) and by considering climate facets that are distinct from those examined in previous studies.

## Method

### *Participants and Procedure*

The data used in this study were collected as a part of a wider project on the relationships between work-unit characteristics and work outcomes in

a regional public health service (RPHS). Within this project, a two-stage randomized sampling procedure was carried out. In the first stage, 250 work units were randomly selected from the RPHS. Work unit was defined as the group of employees who hierarchically depend on the same supervisor. Then, in the second stage, 4 members of each work unit were sampled, 1 of whom was the supervisor, and the other 3 of whom were randomly selected from the unit. A professional interviewing agency approached about 1,000 employees on their jobs and asked them to answer the questionnaire items. The total number of usable questionnaires returned was 932. Unfortunately, and even after several attempts, it was not possible to interview 3 unit members from all of the 250 sampled units. Thus, our research team and the interviewing agency agreed to compensate for this by interviewing more than 3 members pertaining to the more accessible work units. These extrasampled unit members were also randomly selected.

The present study sample consists of survey data from 197 work units of the RPHS from which at least 3 unit members were interviewed. In 70.7% of the sample of work units, 3 members were interviewed; in 26.2%, 4 members answered the questionnaire; and in 3.1%, 5 members were interviewed. The distribution of the study's work units' size shows a median of 21 members ( $M = 30.9$ ,  $SD = 24.6$ ). Sixty-four percent of the units were health service provider units, 24% were administrative units, and 10% were support and maintenance units. Because our interest is focused on the role of within-group agreement of unit members' perceptions, the data gathered from work-unit supervisors were excluded. Thus, the data analyzed were provided by 641 employees who were members of the aforementioned 197 RPHS work units. Sixty-three percent of these employees were women. The average age was 41.2 years ( $SD = 9.6$ ), and the average tenure in the RPHS was 14.4 years ( $SD = 14.4$ ). Twenty-three percent were physicians, 33% were nurses, 15% were nursing auxiliaries, 13% were maintenance personnel, and 14% worked in administrative or technical jobs.

## Measures

**Social interaction.** Social interaction was measured by means of a 3-item scale whose items asked each sampled unit member to describe how frequently he or she talked about the work unit's goals, work planning, and functioning with his or her unit work mates (e.g., "How often do you talk about your work-unit's goals with your unit workmates?"). Respondents answered using a 5-point scale (1 = *never*, 5 = *quite frequently*). Cronbach's alpha was .91.

To test Hypothesis 1, we had to aggregate work-unit members' scores on the social interaction scale at the work-unit level. Therefore, prior to aggregating, we assessed within-unit agreement on social interaction. To do so, we used two complementary approaches (Kozlowski & Klein, 2000): a consistency-based approach (computation of the intraclass correlation coefficient [1], or ICC[1]) and a consensus-based approach (computation of the average deviation index, or  $AD_{M(j)}$ ). The  $AD_{M(j)}$  was recently proposed by Burke, Finkelstein, and Dusig (1999). This index is based on the calculation of the average deviation for each scale item:

$$AD_{M(j)} = \frac{\sum_{n=1}^N |x_{jk} - \bar{x}_j|}{N},$$

where  $AD_{M(j)}$  is the average deviation for an item  $j$ ,  $N$  is the number of respondents or observations,  $x_{jk}$  is the  $k$ th respondent's score on item  $j$ , and  $\bar{x}_j$  is the arithmetic mean of the respondents' scores on item  $j$ . Therefore, the scale  $AD_{M(j)}$  is computed as follows:

$$AD_{M(j)} = \frac{\sum_{j=1}^J AD_{M(j)}}{J},$$

where  $AD_{M(j)}$  is the average deviation computed for  $J$  items, and  $AD_{M(j)}$  is defined as above.

The  $AD_{M(j)}$  index has several advantages compared with the James, Demaree, and Wolf (1984) interrater agreement index ( $r_{wg}$ ; see Burke et al., 1999). First, it does not require modeling the random or null response distribution. The  $AD_{M(j)}$  index only requires an a priori specification of a null response range of interrater agreement. Second, the  $AD_{M(j)}$  index provides estimates of interrater agreement in the metric of the original response scale. For Likert-type response scales with five options, Burke et al. (1999) obtained correlations between the  $AD_{M(j)}$  and the  $r_{wg}$  that ranged between  $-.90$  and  $-.92$ .

Taking into account the number of response options (i.e., 5) and their verbal anchors, we followed Burke and colleagues' (1999) specification of using a null response range equal to or less than 1 when the response scale is a Likert-type 5-point scale. This value is consistent with our judgment that any two contiguous scale points are somewhat similar for the 5-point Likert-type scales used in the present study (Burke et al., 1999). Accordingly, within-unit agreement was concluded when the  $AD_{M(j)}$  values were equal to or less than 1. We computed the  $AD_{M(j)}$  index in the Social Interaction scale for each work unit. The mean  $AD_{M(j)}$  was 0.74 ( $SD = 0.33$ ). The ICC(1) obtained for this scale was .26. Taking into account these results, we concluded that the level of within-unit agreement in the study's work units was sufficient to aggregate unit members' Social Interaction scores to the work-unit level. We also carried out a one-way analysis of variance (ANOVA) to ascertain whether there was statistically significant between-units discrimination in average social interaction. The results obtained,  $F(196, 441) = 1.8$ ,  $p < .01$ , show that there was a significant degree of between-units differentiation and support the validity of the aggregate social interaction measure (Chan, 1998). These analyses of within-unit agreement were also performed whenever a variable was aggregated at the unit level, following the direct consensus model of composition.

**Leader informing behavior.** Leader informing behavior was measured by means of a three-item scale ("My supervisor informs me about issues that can affect me," "My supervisor informs me about work practices and strategies," and "My supervisor guides me by providing clear information about my job"). Respondents answered using a 5-point scale (1 = *strongly in disagreement*, 5 = *strongly in agreement*). Cronbach's alpha for the scale was .89. To test Hypothesis 2, we had to aggregate work-unit members' scores on the Leader Informing Behavior scale at the work-unit level. We computed the  $AD_{M(j)}$  index in the mentioned variable for each work unit. The mean  $AD_{M(j)}$  was 0.82 ( $SD = 0.38$ ). The ICC(1) for this scale showed a value equal to .24. We concluded that the level of within-unit agreement in the studied work units was sufficient to aggregate unit members' Leader Informing Behavior scores to the work-unit level. The one-way ANOVA result,  $F(196, 431) = 1.7$ ,  $p < .01$ , suggests an adequate between-units differentiation in average leader informing behavior and supports the validity of this measure.

**Climate strength.** The study focal variable was operationalized as the degree of within-unit agreement in climate perceptions. Within-unit agreement was measured by means of the  $AD_{M(j)}$  index. Because this index is a direct measure of within-unit variability, prior to testing the study hypotheses, we multiplied the values provided by the  $AD_{M(j)}$  index regarding each climate scale by  $-1$ , so that higher scores represented higher within-unit agreement and higher climate strength.

Respondents were asked to describe the climate of their work unit by answering a nine-item scale that measures three distinct climate facets (Kopelman et al., 1990; Koys & DeCotiis, 1991): support (e.g., "In my work-unit, people show concern and support for work mates' personal problems"), innovation (e.g., "In my work-unit, the ideas that try to improve efficacy and the quality of service are welcome"), and goals orientation (e.g., "In my work-unit, the goals to be reached within a period of time are clearly defined"). Each climate facet was measured by means of three items answered using a 5-point scale (1 = *strongly in disagreement*, 5 = *strongly in agreement*). We submitted the polychoric correlation matrix for the nine



items to a confirmatory factor analysis (CFA) to test the fit of the hypothesized three-factor model. The weighted least square method of estimation, as implemented in LISREL 8 (Jöreskog & Sörbom, 1993), was used. The results obtained,  $\chi^2(24, N = 623) = 110.7, p < .01$ , adjusted goodness-of-fit index (AGFI) = .96, root-mean-square error of approximation (RMSEA) = .072, showed an acceptable fit for the model. The three-factor model's fit was compared with the fit of a one-factor model,  $\chi^2(27, N = 623) = 238.1, p < .01$ , AGFI = .93, RMSEA = .11. The difference between chi-square values,  $\chi^2(3, N = 623) = 127.4, p < .01$ , revealed that the three-factor model yielded a better fit. Cronbach's alphas for the three climate subscales were as follows: Support: 0.86, Innovation: 0.63, and Goals Orientation: 0.78.

To test Hypothesis 3, we had to aggregate work-unit members' scores on the three climate subscales at the work-unit level. The  $AD_{M(j)}$  was computed for each climate subscale and each work unit. The  $AD_{M(j)}$  values obtained for the three climate subscales presented the following means: Support: 0.60 ( $SD = 0.32$ ), Innovation: 0.76 ( $SD = 0.31$ ), and Goals Orientation: 0.74 ( $SD = 0.30$ ). The ICC(1) values for each climate scale were as follows: Support: .36, Innovation: .26, and Goals Orientation: .26. Considering the  $AD_{M(j)}$  and the ICC(1) values obtained, we concluded that the level of within-unit agreement in the study's work units was sufficient to aggregate unit members' climate scores to the work-unit level. The one-way ANOVA results show adequate between-units discrimination in average climate scores and support the validity of the aggregate climate measures: support,  $F(196, 442) = 2.3, p < .01$ ; innovation,  $F(196, 442) = 1.8, p < .01$ ; goals orientation,  $F(196, 442) = 1.8, p < .01$ .

*Work satisfaction.* Work satisfaction was measured by means of a 22-item questionnaire designed to obtain a measure of overall work satisfaction. Respondents had to report on the degree of satisfaction or dissatisfaction produced by different work-related factors. They responded to items using a 5-point scale (1 = *strongly dissatisfied*, 5 = *strongly satisfied*). We submitted the polychoric correlation matrix for the 22 items to a CFA to test the fit of the hypothesized one-factor model. The results obtained,  $\chi^2(209, N = 625) = 785.1, p < .01$ , AGFI = .90, RMSEA = .066, showed an acceptable fit for the model. Cronbach's alpha was .89. To test Hypothesis 3, we had to aggregate work-unit members' scores on the Work Satisfaction scale at the work-unit level. Previous studies have provided a theoretical framework and empirical support for aggregating unit members' affective responses to the unit level (Bliese & Halverson, 1998; George, 1990, 1996; González-Romá et al., 2000). The mean  $AD_{M(j)}$  was 0.67 ( $SD = 0.16$ ), and the ICC(1) value was .31. Thus, we concluded that unit members' scores on the Work Satisfaction Scale could be aggregated at the unit level. The one-way ANOVA result,  $F(196, 443) = 2.0, p < .01$ , points out an adequate between-units differentiation in average work satisfaction and supports the validity of the aggregate work satisfaction measure.

*Organizational commitment.* Organizational commitment was measured by three items (e.g., "I share the goals of my organization") that were selected from the Identification and Internalization subscales of O'Reilly and Chatman's (1986) Organizational Commitment Questionnaire. Respondents answered using a 5-point scale (1 = *strongly in disagreement*, 5 = *strongly in agreement*). Cronbach's alpha was .91. As in the former case, to test Hypothesis 3, we had to aggregate unit members' scores on the organizational commitment scale at the work-unit level. Thus, within-unit agreement had to be demonstrated. The mean  $AD_{M(j)}$  was 0.68 ( $SD = 0.32$ ), and the ICC(1) value was .22. We concluded that unit members' scores on this scale could be aggregated at the unit level. The one-way ANOVA result,  $F(196, 441) = 1.7, p < .01$ , suggests an adequate between-units differentiation and supports the validity of the aggregate organizational commitment measure.

Results

The correlations among the study variables are shown in Table 1. According to Hypothesis 1, work-unit social interaction was significantly correlated with climate strength in goals orientation ( $r = .20, p < .01$ ) and innovation ( $r = .22, p < .01$ ). The correlation with climate strength in support was not significant. It could be expected that employees in small units have more opportunities for social interaction than do employees in large units. Therefore, we checked whether work-unit size could explain the aforementioned relationships. Work-unit size was negatively related to work units' scores on social interaction ( $r = -.19, p < .01$ ), but it was not related to climate strength in the three climate facets ( $r_s = .04, -.06, \text{ and } -.11$  for support, innovation, and goals orientation, respectively). Once work-unit size was controlled, work-unit social interaction maintained its significant positive relationships with climate strength in goals orientation and innovation (partial  $r_s = .20$  and  $.19, p < .01$ , respectively). Thus, unit size does not explain the relationship between units' aggregate social interaction and climate strength in these climate facets. As we expected (Hypothesis 2), leader informing behavior was positively correlated with climate strength in the climate facets of support ( $r = .21, p < .01$ ), innovation ( $r = .29, p < .01$ ), and goals orientation ( $r = .18, p < .05$ ).

With respect to Hypothesis 3, the results of the hierarchical regression analyses show that the interaction between work units' average climate scores and climate strength predicted the criterion variables in three out of the six hierarchical regression analyses carried out (see Table 2). Climate strength moderated the relation-

Table 1  
Work-Unit Means, Standard Deviations, and Intercorrelations Among the Study Variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Social interaction	2.70	1.37	—									
2. Leader informing behavior	3.21	0.88	.17*	—								
3. CS support <sup>a</sup>	0.60	0.32	.00	.21**	—							
4. CS innovation <sup>a</sup>	0.76	0.30	.22**	.29**	.30**	—						
5. CS goals <sup>a</sup>	0.73	0.30	.20**	.18**	.27**	.40**	—					
6. Support	4.00	0.70	.02	.36**	.55**	.11	.15*	—				
7. Innovation	3.51	0.66	.18*	.45**	.33**	.27**	.11	.47**	—			
8. Goals orientation	3.31	0.71	.27**	.56**	.27**	.19**	.17*	.51**	.67**	—		
9. Work satisfaction	3.16	0.43	.18**	.55**	.13	.19**	.05	.34**	.47**	.60**	—	
10. Organizational commitment	3.59	0.66	.06	.33**	.06	.03	.00	.14*	.30**	.41**	.60**	—

Note. CS = climate strength.

<sup>a</sup> The mean shown is for the corresponding  $AD_{M(j)}$  index.

\*  $p < .05$ , two-tailed. \*\*  $p < .01$ , two-tailed.

Table 2  
Hierarchical Regression Analyses of Work Units' Average Work Satisfaction and Organizational Commitment on Work Units' Average Climate Facets and Climate Strength

Dependent variable	Step 1	Step 2	Step 3
Support			
Work satisfaction			
Work-unit support climate	.34**	.39**	.43**
CS in support climate		.08	.24
Interaction			-.14
R <sup>2</sup>	.11	.11	.11
ΔR <sup>2</sup>		.01	.00
Organizational commitment			
Work-unit support climate	.14*	.15	.37*
CS in support climate		.02	.74
Interaction			-.64
R <sup>2</sup>	.01	.01	.02
ΔR <sup>2</sup>		.00	.02
Innovation			
Work satisfaction			
Work-unit innovation climate	.47**	.45**	.77**
CS in innovation climate		-.01	-.79*
Interaction			.84**
R <sup>2</sup>	.22	.22	.25
ΔR <sup>2</sup>		.00	.03**
Organizational commitment			
Work-unit innovation climate	.30**	.32**	.81**
CS in innovation climate		.05	-1.35**
Interaction			1.28**
R <sup>2</sup>	.09	.09	.15
ΔR <sup>2</sup>		.00	.06**
GO			
Work satisfaction			
Work-unit GO climate	.60**	.61**	.69**
CS in GO climate		.05	.25
Interaction			-.21
R <sup>2</sup>	.35	.35	.35
ΔR <sup>2</sup>		.00	.00
Organizational commitment			
Work-unit GO climate	.41**	.42**	.67**
CS in GO climate		-.07	-.69*
Interaction			.64*
R <sup>2</sup>	.15	.15	.17
ΔR <sup>2</sup>		.00	.02*

Note. All the regression coefficients reported in the table are standardized regression coefficients. CS = climate strength; GO = goals orientation. \*  $p < .05$ . \*\*  $p < .01$ .

ship between innovation and the two criteria considered: work satisfaction, incremental  $F(1, 193) = 6.36, p < .01$ ; and organizational commitment, incremental  $F(1, 193) = 13.14, p < .01$ . The interaction term accounts for an additional 3% of the variance of work units' score on work satisfaction and an additional 6% of the variance of work units' score on organizational commitment. In the regression of work units' organizational commitment on work units' goals orientation average score and climate strength, the inclusion of the interaction term also yielded a significant incremental  $F$  ratio,  $F(1, 193) = 4.10, p < .05$ . In this case, the interaction term accounted for an additional 2% of the variance of work units' scores on organizational commitment.

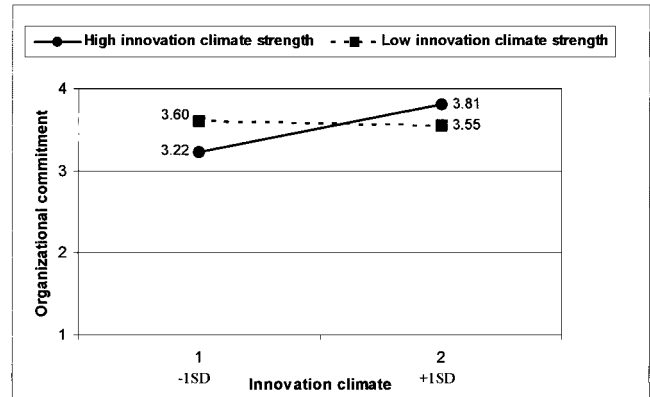


Figure 1. Moderating effect of climate strength in innovation on the relationship between units' innovation climate and organizational commitment.

To better understand the interaction effects we found, we plotted them (see Figures 1, 2, and 3). In the three figures, the line associated with the high climate strength group showed the greatest slope. This means that the relationship between the corresponding units' climate scores and the implied criteria is stronger for the high climate strength group than for the low climate strength group. This result is congruent with our expectation (Hypothesis 3) that when climate strength was high, the influence of units' climate on the considered dependent variables would be high and that when climate strength was low, the aforementioned influence would be weakened.

### Discussion

The aim of the present article is to examine some of the possible antecedents and moderator influences of climate strength. The results obtained provide substantial support for Hypothesis 1. Social interaction was significantly correlated with climate strength in goals orientation and innovation but not with climate strength in support. These results might have to do with the fact that our measure of social interaction is focused on social interaction regarding work-related issues (i.e., work unit's goals, plan-

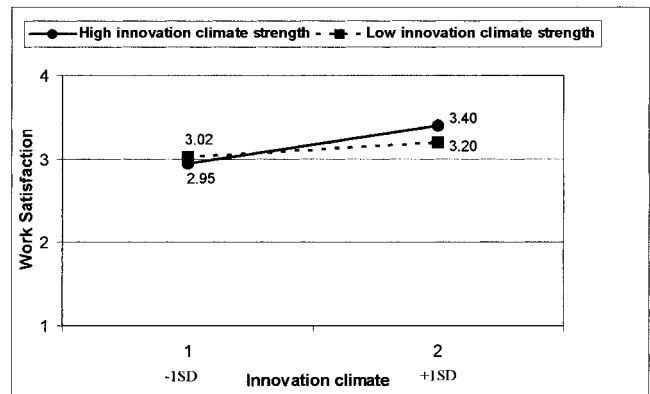


Figure 2. Moderating effect of climate strength in innovation on the relationship between units' innovation climate and work satisfaction.

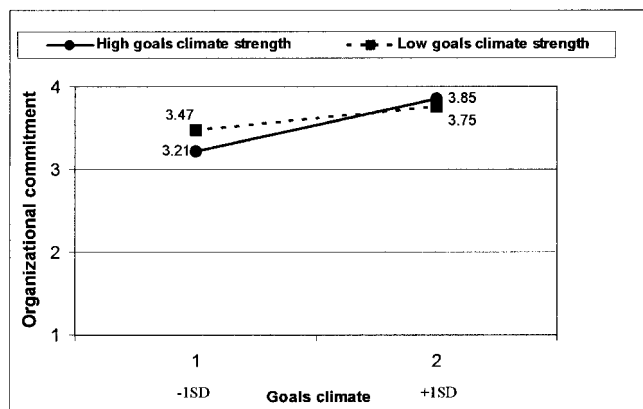


Figure 3. Moderating effect of climate strength in goals orientation on the relationship between units' goals climate and organizational commitment.

ning, and functioning). Our measures of innovation and goals orientation are also focused on work-related issues (i.e., innovation for improving the quality of work, goal clarity, and work efficacy); however, our measure of support is more focused on the quality of personal relationships among unit members. In general terms, these results are congruent with those obtained by Klein et al. (2001). These researchers found significant correlations between social interaction and climate strength in three climate facets. All these results suggest that interaction among work-unit members fosters similarity in their psychological climates and promotes the emergence of work units' climate as a unit-level construct. Considering the cross-sectional nature of both studies, we cannot provide conclusions about the causal ordering between the variables. The similarity-attraction paradigm posits that individuals tend to be attracted to those who are similar to them in terms of demographic characteristics, views, activities, or attitudes (Green, Anderson, & Shivers, 1996). Moreover, similarity between individuals is related to frequent communication and integration in social groups (Tsui & O'Reilly, 1989). Thus, it is possible that unit members choose to interact with individuals who have similar work-unit climate perceptions (Klein et al., 2001). Future studies with a longitudinal design should clarify this question.

Hypothesis 2 is supported by the results we obtained. Work-unit leaders' informing behavior significantly correlated with climate strength in the three climate facets considered (support, innovation, and goals orientation). These results support the idea that leaders may serve as interpretive filters of relevant work-unit events, features, and processes (Kozlowski & Doherty, 1989). Thus, through informing behaviors, leaders can shape unit members' climate perceptions, contributing to fostering climate strength. Together with previous empirical studies (e.g., Kozlowski & Doherty, 1989), our study results also highlight the relevant role that leaders play in work-unit climate formation. Future studies should investigate the impact of other leadership variables (e.g., leaders' influence) on climate strength (Brown & Kozlowski, 1999).

The moderator role of climate strength (Hypothesis 3) was fully supported in the case of the climate facet of innovation. Climate strength in innovation perceptions moderated the impact of work

units' innovation climate on average satisfaction and commitment. In the case of goals orientation, the moderator hypothesis was only partially supported. Climate strength in this climate facet moderated the influence of work units' goals orientation on average commitment but did not moderate the impact on average satisfaction. Finally, climate strength in support perceptions did not moderate the influence of work units' support on any of the criterion variables. In all the cases in which climate strength showed a moderator influence (three out of six), it was in the expected direction: Climate strength fostered the influence of work units' climate on the criterion variables. These results are congruent with the idea that climate strength affects the predictability of units' aggregate affective responses from units' aggregate climate. Strong climates foster uniform and consistent affective responses, whereas weak climates yield larger variability in the associated affective responses. This is what makes these responses more predictable in strong climate conditions than in weak climate conditions (Lindell & Brandt, 2000).

The moderator effects discovered here show the same direction as do the moderator effects reported by Salvaggio et al. (2000). They found that for one of their climate measures (the Managerial Practices Climate scale), climate strength moderated the impact of units' average climate on four out of the five scales of customer perceptions of service quality that they used, so that the relationship between units' climate and customer perceptions disappeared when climate strength was low. However, Bliese and Halverson's (1998) results do not support the moderator role of climate strength but rather its main effect on units' average psychological well-being. Finally, Lindell and Brandt (2000) did not find substantial support for either the moderator role of climate strength or its direct impact on individual and organizational outcomes. The different effects shown by climate strength in all these studies may have to do with the kind of work units studied. Many of the tasks performed within the LEPCs studied by Lindell and Brandt (2000) can be performed by a single person. This suggests that "the types of tasks performed within LEPCs might not require as high a level of member consensus as that required for effective performance in other types of organizations" (Lindell & Brandt, 2000, p. 345). Many of the tasks performed within health care units, bank units, and Army companies require unit members' cooperation and collaboration. Compared with LEPCs, these types of work units have a high degree of team member interdependence. The results provided by the present study and those cited above suggest that team member interdependence may be a key requisite for climate strength to have a direct or moderator influence on work-unit outcomes (Lindell & Brandt, 2000). Moreover, the fact that within-unit cohesion and consensus are explicitly more stressed and important in the military companies studied by Bliese and Halverson (1998) than in the service work units investigated here and in the study by Salvaggio et al. (2000) might help to explain why climate strength showed main effects in the former and moderator effects in the latter. More studies are needed before a conclusion can be reached. However, taken together, all these results suggest that climate strength may have an important role in the understanding of the consequences of work units' climate.

Our study has some limitations. First, its cross-sectional nature precludes any sound conclusion about the causality among the studied variables and suggests that the results obtained should be interpreted with caution. To obtain results that allow conclusions

about this issue to be derived, researchers should carry out investigations with a longitudinal design in the future. Second, the work units sampled for this study met the within-unit agreement criterion for aggregation of unit members' climate perceptions. This means that our climate strength variables presented some range restrictions that have probably weakened the moderator hypothesis test. However, this problem is difficult to avoid. This hypothesis assumes that units' aggregate climate has an influence on units' aggregate affective responses. Therefore, to test the hypothesis, we have to aggregate work-unit members' scores on the three climate facets at the work-unit level. For this to be possible, a sufficient level of within-unit agreement has to be previously demonstrated; otherwise the unit average score would not be representative. Consequently, the problem of range restriction is present to some extent when the moderator hypothesis is tested. The situation is different when researchers test hypotheses regarding the antecedents and direct consequences of climate strength. In those cases, the optimal sample should include units that range from very low to very high within-unit agreement. Third, all data come from the same source, and this makes the identification of moderators more difficult because same source data tend to be correlated. Fourth, our study only considers three climate dimensions, and the results obtained point out that climate strength showed a moderator influence in only two of these dimensions. Before drawing a sound conclusion about the moderator influence of climate strength, future studies should investigate the hypothetical moderator influence of climate strength in other climate dimensions that have not been considered here (see Koys & DeCotiis, 1991). A final concern has to do with the number of participants sampled from each work unit. In 70.7% of the study work units, only 3 members were randomly selected. This sample size was selected because it represents a minimum size to operationalize work-unit constructs (e.g., Klein et al., 2001) and because of cost. Considering the mean (30.9) and the standard deviation (24.6) of unit size, the small sampling fraction attained for some units (less than 1:10) may raise doubts about the suitability of a 3-participant sample. However, we stress that the *simple random sampling* (SRS) procedure used within each unit yields a number of advantages that counteract these doubts and that cannot be provided by the frequently used *convenience sampling* procedure. Those advantages are that (a) selection biases are avoided, (b) SRS guarantees that every member within each unit has the same probability of being selected, (c) SRS allows us to use estimators of unit parameters with little or no bias, and (d) SRS allows us to obtain estimates of the precision of unit sample estimates<sup>1</sup> (Kalton, 1983).

The present study also has a number of implications for future theoretical development and research. First, Brown and Kozlowski (1999) claimed that more empirical research was necessary to develop the DT. Our study provides empirical evidence supporting some of the tentative propositions they formulated about the causes and consequences of climate strength. These promising results should encourage other researchers to test DT propositions in other domains (e.g., emotional climate). Second, multilevel researchers should notice that the prerequisite of within-unit agreement established in the direct consensus model of composition does not imply a total lack of within-unit variability. We emphasize that, even when a specific within-unit agreement criterion is met, units can show some variance regarding climate strength, and, under these conditions, climate strength may have significant

moderator effects. Finally, researchers interested in understanding the influence of work units' climate on work units' outcomes should consider climate strength as a possible explanatory variable.

<sup>1</sup> For instance, if one assumes a sampling fraction of 3:31, that the sampling distribution of the mean approximates the normal distribution, and a within-unit standard deviation of 1.0 for a given variable and a given unit (a reasonable assumption for any variable in the present study), the 95% confidence interval for the work-unit mean is the three-participant sample mean  $\pm 1.0$ . This represents a reasonable precision.

## References

- Ashforth, B. E. (1985). Climate formation: Issues and extension. *Academy of Management Review*, 4, 837–847.
- Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.
- Blake, R. R., & Mouton, J. S. (1968). *The managerial grid*. Houston, TX: Gulf Publishing.
- Bliese, P. D., & Halverson, R. R. (1998). Group consensus and psychological well-being: A large field study. *Journal of Applied Social Psychology*, 28, 563–580.
- Brown, K. G., & Kozlowski, S. W. J. (1999, April). *Dispersion theory: Moving beyond a dichotomous conceptualization of emergent organizational phenomena*. Paper presented at the 14th annual meeting of the Society of Industrial and Organizational Psychology, Atlanta, GA.
- Burke, N. J., Finkelstein, L. M., & Dusig, M. S. (1999). On average deviation indices for estimating interrater agreement. *Organizational Research Methods*, 2, 49–68.
- Chan, D. (1998). Functional relationships among constructs in the same content domain at different levels of analysis: A typology of composition models. *Journal of Applied Psychology*, 83, 234–246.
- Chatman, J. A., Polzer, J. T., Barsade, S. G., & Neale, M. A. (1999). Being different yet feeling similar: The influence of demographic composition on work processes and outcomes. *Administrative Science Quarterly*, 43, 749–780.
- George, J. M. (1990). Personality, affect, and behavior in groups. *Journal of Applied Psychology*, 75, 107–116.
- George, J. M. (1996). Group affective tone. In M. A. West (Ed.), *Handbook of work group psychology* (pp. 77–94). Chichester, England: Wiley.
- González-Romá, V., Peiró, J. M., Subirats, M., & Mañas, M. A. (2000). The validity of affective work-team climates. In M. Vartiainen, F. Avallone, & N. Anderson (Eds.), *Innovative theories, tools and practices in work and organizational psychology* (pp. 97–109). Göttingen, Germany: Hogrefe & Huber.
- González-Romá, V., Ramos, J., Peiró, J. M., Rodríguez, I., & Muñoz, P. (1994). Formación del clima de los equipos de trabajo e interacción social [Work-team climate formation and social interaction]. In R. Zurriaga & M. D. Sancerni (Eds.), *Experiencias laborales en organizaciones de trabajo* (pp. 65–78). Valencia, Spain: Nau Llibres.
- Green, S. G., Anderson, S. E., & Shivers, S. L. (1996). Demographic and organizational influences on leader-member exchange and related work attitudes. *Organizational Behavior and Human Decision Processes*, 66, 203–214.
- Jackson, J. (1975). Normative power and conflict potential. *Sociological Methods and Research*, 4, 237–263.
- James, L. (1982). Aggregation bias in estimates of perceptual measures. *Journal of Applied Psychology*, 67, 219–229.
- James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, 69, 85–98.
- Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation*



- modeling with the SIMPLIS command language. Chicago: Scientific Software.
- Kalton, G. (1983). *Introduction to survey sampling*. Beverly Hills, CA: Sage.
- Klein, K. J., Conn, A. B., Smith, D. B., & Sorra, J. S. (2001). Is everyone in agreement? An exploration of within-group agreement in employee perceptions of the work environment. *Journal of Applied Psychology, 86*, 3–16.
- Kopelman, R. E., Brief, A. P., & Guzzo, R. A. (1990). The role of climate and culture in productivity. In B. Schneider (Ed.), *Organizational climate and culture* (pp. 282–318). San Francisco: Jossey-Bass.
- Koys, D. J., & DeCotiis, T. A. (1991). Inductive measures of psychological climate. *Human Relations, 44*, 265–285.
- Kozlowski, S. W. J., & Doherty, M. L. (1989). Integration of climate and leadership: Examination of a neglected issue. *Journal of Applied Psychology, 74*, 546–553.
- Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 3–90). San Francisco: Jossey-Bass.
- Lewin, K. (1951). *Field theory in the social science*. New York: Harper.
- Likert, R. (1967). *The human organization: Its management and value*. New York: McGraw-Hill.
- Lindell, M. K., & Brandt, C. J. (2000). Climate quality and climate consensus as mediators of the relationship between organizational antecedents and outcomes. *Journal of Applied Psychology, 85*, 331–348.
- McGregor, D. (1960). *The human side of enterprise*. New York: McGraw-Hill.
- Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review, 80*, 252–283.
- Moran, E. T., & Volkwein, J. F. (1992). The cultural approach to the formation of organizational climate. *Human Relations, 45*, 19–47.
- O'Reilly, C., & Chatman, J. (1986). Organizational commitment and psychological attachment: The effects of compliance, identification and internalization on prosocial behavior. *Journal of Applied Psychology, 71*, 492–499.
- Ostroff, C. (1993). The effects of climate and personal influences on individual behavior and attitudes in organizations. *Organizational Behavior and Human Decision Processes, 56*, 56–90.
- Ostroff, C., & Bowen, D. E. (2000). Moving HR to a higher level: HR practices and organizational effectiveness. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations* (pp. 211–266). San Francisco: Jossey-Bass.
- Pritchard, R. D., & Karasick, B. W. (1973). The effect of organizational climate on managerial job performance and job satisfaction. *Organizational Behavior and Human Performance, 9*, 126–146.
- Rentsch, J. (1990). Climate and culture: Interaction and qualitative differences in organizational meanings. *Journal of Applied Psychology, 75*, 668–681.
- Repetti, R. L., & Cosmas, K. A. (1991). The quality of social environment at work and job satisfaction. *Journal of Applied Social Psychology, 21*, 840–854.
- Rousseau, D. M. (1985). Issues of level in organizational research: Multi-level and cross-level perspectives. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 7, pp. 1–37). Greenwich, CT: JAI Press.
- Salvaggio, A. N., Schneider, B., & Subirats, M. (2000, April). *Consensus and climate for service: A reanalysis of Schneider, White and Paul (1998)*. Paper presented at the 15th annual meeting of the Society of Industrial and Organizational Psychology, New Orleans, LA.
- Schein, E. (1985). *Organizational culture and leadership*. San Francisco: Jossey-Bass.
- Schneider, B., & Reichers, A. E. (1983). On the etiology of climates. *Personnel Psychology, 36*, 19–39.
- Tsui, A. S., & O'Reilly, C. A. (1989). Beyond simple demographic effects: The importance of relational demography in superior-subordinate dyads. *Academy of Management Journal, 32*, 402–423.
- West, M. A., Smith, H., Feng, W. L., & Lawthorn, R. (1998). Research excellence and departmental climate in British universities. *Journal of Occupational and Organizational Psychology, 71*, 261–281.
- Yukl, G., & Van Fleet, D. D. (1992). Theory and research on leadership in organizations. In M. D. Dunnette & L. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., Vol. 3, pp. 149–197). Palo Alto, CA: Consulting Psychologists Press.

Received November 14, 2000

Revision received August 1, 2001

Accepted August 20, 2001 ■