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What is This?
A Workgroup Climate Perspective on the Relationships Among Transformational Leadership, Workgroup Diversity, and Employee Creativity

Peng Wang¹, Joseph C. Rode¹, Kan Shi², Zhengxue Luo³ and Wenjing Chen⁴

Abstract
Previous research on the effects of workgroup diversity and workgroup functioning and outcomes has produced mixed results. We address these inconsistencies by proposing a model that considers the effects of both transformational leadership and workgroup climate on one workgroup outcome believed particularly relevant to diversity: employee creativity. Multilevel analyses of 172 individuals working in 31 teams found that innovation workgroup climate level mediated the relationship between transformational leadership and employee creativity. Furthermore, results indicated that diverse groups had higher innovation climate strength when transformational leadership was high, and that innovation climate level was more strongly related to employee creativity when innovation climate strength was high. Overall, these results suggest that transformational...
leadership may lessen the negative effects associated with workgroup diversity. Implications for both theory and practice are discussed.

**Keywords**

transformational leadership, innovation climate, creativity

Over the past couple of decades, workgroup diversity has received significant research attention, largely mirroring increases in workforce diversity and team-based organizational structures. One important workplace outcome related to diversity is employee creativity (Bell, Villado, Lukasik, Belau, & Briggs, 2011; Jackson, Joshi, & Erhardt, 2003). However, most studies have examined the relationship between group diversity and group creative performance, while knowledge about how group diversity relates to individual creativity is limited (Choi, 2007, 2007b; Jackson et al., 2003; Shin, Kim, Lee, & Bian, 2012). The effects of group diversity in general, and demographic diversity in particular, on individual creativity may be significant given that the feelings and behaviors of individuals working in groups are known to be influenced by relational demography and group composition (Jackson et al., 2003). To address this gap, we examine how group demographic diversity influences employee creativity through a multilevel, cross-level approach.

Workgroup diversity is thought to positively impact creativity and innovation as a result of increased ideas and perspectives provided by workgroup members with wider ranges of backgrounds and perspectives (Jehn, Northercraft, & Neale, 1999). For example, Hoever, van Knippenberg, van Ginkel, and Barkema (2012) found that functional diversity among group members was related to group creativity and, more specific to the current study, Richter and colleagues (2012) found that group functional diversity was related to individual creativity. However, the majority of the studies supporting this perspective have focused on diversity in knowledge, skills, perspectives, and thinking styles. An opposing perspective poses that demographic diversity can increase conflict and communication difficulties, thus limiting potential diversity benefits (Bell et al., 2011; Jackson et al., 2003; Richard, McMillian, Chadwick, & Dwyer, 2003). In support of this perspective, Bell and colleagues (2011) found small negative relationships in their meta-analyses of group demographic diversity variables and group creativity. In one of the few studies that has examined the effects of group demographic diversity on individual creativity, Choi (2007a) reported inconsistent results. These divergent conclusions suggested that additional constructs...
need to be considered to better understand how demographic diversity affects creativity (Bell et al., 2011; Yang & Konrad, 2011).

One such construct may be a workgroup’s innovation climate, or the perceptions that workgroup members share regarding the available support for new and creative ideas (Kanter, 1983; Scott & Bruce, 1994). While emerging research suggests that diversity negatively impacts climate strength, or the consensus across group members’ perceptions of the workgroup climate (Chan, 1998; Colquitt, Noe, & Jackson, 2002), it is unlikely that diversity would affect climate level. However, workgroup climate level has been associated with transformational leadership (Eisenbeiss, van Knippenberg, & Boerner, 2008; Gil, Rico, Alcover, & Barrasa, 2005), a construct that has been linked to individual creativity (Shin & Zhou, 2007; Shin et al., 2012) and that has theoretical implications for the effects of demographic diversity on climate strength.

We address the inconsistencies found in the diversity and creativity literature by testing a model that includes diversity, innovation climate, and transformational leadership. We focus on demographic diversity, particularly age and gender. These attributes are most readily observable upon first meeting a person and are associated with increased stereotyping, interpersonal conflict, and communication difficulties (Choi, 2007b; Jackson et al., 2003), all of which have negative effects on the work environment with respect to creativity (Amabile & Conti, 1999; Scott & Bruce, 1994; Wallace, Johnson, Mathe, & Paul, 2011).

Below, we present our model in detail and provide theoretical support for seven resulting hypotheses, which we tested with a sample of 172 employees working in 31 teams and representing nine organizations. Our study contributes to the literature by synthesizing literatures from three separate areas (diversity, leadership, and innovation climate) into a model with both theoretical and practical applications. It also expands the literature on innovation climate to take into account climate strength as well as the more commonly studied climate level.

**Theory and Hypotheses**

As shown in Figure 1, our research model proposes that group demographic diversity is negatively related to group innovation climate strength, defined as the degree of shared perceptions among workgroup members concerning the effectiveness of the policies, practices, and procedures designed to support innovative change and the pursuit of new ideas (Chan, 1998; Kanter, 1983; Scott & Bruce, 1994; Seigel & Kaemmerer, 1978). It also proposes that transformational leadership is both positively related to group innovation
climate level, defined as the average of the group members’ rating of the innovation climate, and is a moderator of the relationship between group demographic diversity and group innovation climate strength. Finally, our model proposes that group innovation climate level is positively related to individual creativity and that this relationship is moderated by group innovation climate strength.

**Demographic Diversity and Innovation Climate Strength**

Social identity theory (Tajfel & Turner, 1986; Turner, 1987) suggests that people categorize demographically different coworkers as members of their out-group and, as a result, are less likely to communicate and cooperate with them. Likewise, the similarity-attraction paradigm (Byrne, 1971) predicts that similarities between group members form the basis for interpersonal attraction and frequent social interaction. Perceived similarity makes “interactions easier, reinforcing, and more desirable” (Riordan, 2000). Conversely, people who perceive themselves as dissimilar to others in the group may feel alienated and consequently may tend to withdraw from social interaction. Previous research has linked demographic diversity, such as sex and age dissimilarities, with greater psychological distance, less communication, and lower levels of cooperation among team members (Chatman & Flynn, 2001; Harrison, Price, Gavin, & Florey, 2002; Hoffman, 1985; Lincoln & Miller, 1979).

Young and Parker (1999) suggest that social interaction is the process through which individuals’ beliefs and perceptions converge. Thus, the decreased social interaction and communication found in heterogeneous groups may limit consensus of climate perceptions among group members. Conversely, the shared ideas and perspectives that accompany frequent social interactions should facilitate the convergence of members’ interpretation of

![Figure 1. Hypothesized theoretical model.](image-url)
workplace features and events. In support of this notion, Klein, Conn, Smith, and Sorra (2001) suggested that heterogeneous group members are more likely to develop diverse perceptions of their work environment. Moreover, Ford and Seers (2006) found that close peer relationships reinforce perceptual congruence across members. Similarly, Colquitt and colleagues (2002) found groups with greater age diversity developed more varying evaluations of their procedural justice climate. We therefore offer the following hypothesis:

**Hypothesis 1 (H1):** Group demographic diversity is negatively related to innovation climate strength.

**Transformational Leadership and Innovation Climate Level**

According to Bass and Avolio (1994) transformational leaders demonstrate behaviors in four categories: idealized influence, or leader behaviors that garner pride, respect, and trust from subordinates; inspirational motivation, or leader behaviors that articulate a compelling vision of the future and communicate high expectations; intellectual stimulation, or leader behaviors that encourage followers to challenge the status quo and promote and reformulate problems; and individualized consideration, or leader behaviors that address individual employee needs, provide employees discretion to act, and that demonstrate encouragement and support.

Prior research has proposed both a direct relationship between transformational leadership and employee creativity (Kahai, Sosik, & Avolio, 2003) and an indirect relationship mediated by employee self-concept (Shin & Zhou, 2003, 2007). We propose that transformational leadership may influence creativity by fostering a work context that supports creative outcomes. This perspective is consistent with Schein (2004), who argues that the effects of leadership are largely transmitted indirectly through its effect on the work environment.

Climate perceptions arise from an individual’s interpretation of the meaning inherent in organizational policies, practices, and procedures (Kozlowski & Farr, 1988). As a salient facet of the immediate organizational context, the leadership behaviors displayed by immediate supervisors are believed to be important to subordinates’ interpretations of the work environment (Kozlowski & Doherty, 1989; Schneider, 1983) and, by extension, climate perceptions. Transformational leaders articulate a compelling future vision and align employees’ personal values and goals with company vision (i.e., inspirational motivation; Bass, Avolio, Jung, & Berson, 2003), presumably
inspiring subordinates to initiate and implement changes that facilitate organizational success (Zaccaro & Banks, 2004). Transformational leaders encourage new and different approaches at work and provide employees with discretion to act (i.e., intellectual stimulation; Bass et al., 2003). Transformational leaders convey their commitment to employees’ developmental needs, provide support for employees’ learning activities, and encourage employees to apply newly learned skills on the job (i.e., individualized consideration; Bass et al., 2003). Finally, transformational leaders serve as change agents and creative role models by demonstrating innovative and appropriate behaviors (i.e., idealized influence; Bass et al., 2003). By practicing these behaviors over time, transformational leaders establish a consistent pattern of behaviors that stimulate, support, and reinforce creative engagement, conveying to subordinates that their workgroup expects and values creativity and innovation. Given the impact of observed leadership behaviors on employee interpretation of the work environment (Bandura, 1986; Schein, 2004), employees of transformational leaders are likely to form greater levels of innovation climate perceptions. Based on the arguments presented above, we offer the following hypothesis:

**Hypothesis 2 (H2):** Transformational leadership is positively related to innovation climate level.

**Moderating Effects of Transformational Leadership**

Hypothesis 1 argued that the decreased social interactions and increased dysfunctional interpersonal behaviors associated with demographic diversity leads to lower innovation climate strength. We propose that transformational leadership mitigates the negative effects of demographic diversity in at least two ways. First, as an extension of social categorization theory and social identity theory, the principle of functional antagonism suggests that when one social category becomes more salient, others become less so (Turner, Oakes, Haslam, & McGarty, 1994). This principle implies that the salience of demographic categories may decrease in the presence of a strong alternative social category that unites group members. If the perception of belonging to one superordinate group becomes salient, group members may focus less on demographic dissimilarities (Chatman & Flynn, 2001), as they include these members within a larger in-group (Chatman & Flynn, 2001; Dovidio, Gaeriner, & Validzic, 1998). This inclusive mind-set may increase communication and cooperation within the group, facilitating consistency across members’ innovation climate perceptions.
Transformational leaders articulate a compelling vision of their company’s future, connect subordinates’ self-concept to the mission and to the group, and redirect subordinates’ focus toward their superordinate common goals (Bass et al., 2003; Kark & Shamir, 2002). Previous research found that transformational leaders strengthened subordinates’ identification with the group (Kark, Shamir, & Chen, 2003), thereby increasing subordinates’ willingness to contribute to group objectives (Shamir, Zakay, Breinin, & Popper, 1998). Drawing on the functional antagonism principle, we expect that the shared vision inherent to transformational leadership will strengthen perceptions of one superordinate in-group, and that the resulting increased social interactions will facilitate consensus of workgroup climate perceptions. This effect should be especially relevant to groups high in demographic diversity, given that demographic diversity is associated with greater psychological distance and lower levels of interaction among team members (Chatman & Flynn, 2001; Harrison et al., 2002; Hoffman, 1985).

Second, transformational leaders stress the importance of working as a group, increasing members’ awareness of task interdependence and the need to work collaboratively to effectively deal with these interdependencies (Shamir, 1990). Focusing on the task interdependence of group work should increase the commitment of group members to work through conflict and communication barriers resulting from demographic diversity (Choi, 2007a; Jackson et al., 2003; Mohammed & Angell, 2004). Recent findings support this assertion, showing that demographic diversity is less likely to result in relationship conflict when team members value group work (Mohammed & Angell, 2004). Again, the increased opportunities to share ideas and perspectives may foster greater consistency in individual perceptions of the workgroup climate. Based on the above arguments, we offer the following hypothesis:

_Hypothesis 3 (H3): Transformational leadership moderates the relationship between group demographic diversity and innovation climate strength such that the relationship will be less negative when transformational leadership is higher than when it is lower._

_Innovation Climate Level and Employee Creativity_

Consistent with previous literature we define individual creativity as the development of novel and useful ideas concerning products, practices, services, and procedures by individual employees (Amabile, 1988; Kahai et al., 2003; Shin & Zhou, 2003, 2007). While individual creativity is influenced by
individual differences such as personality, cognitive style, and intrinsic motivation (Oldham & Cummings, 1996; Scott & Bruce, 1994; Tierney, Farmer, & Graen, 1999), the context in which employees work, including group composition, leadership, the workplace climate, and organizational structure, also impact creativity (Oldham & Cummings, 1996; Scott & Bruce, 1994; Shin & Zhou, 2007; Tierney et al., 1999). Mumford, Scott, Gaddis, and Strange (2002) suggested that supportive social and contextual components of the work environment are necessary to creative outcomes.

Organizational climate provides group members with cues regarding appropriate behaviors and clarifies the path to secure rewards in the workgroup (Kopelman, Brief, & Guzzo, 1990). Members of high innovation climate workgroups believe in their workplace values and provide more social and instrumental rewards for creativity than do members of less innovative climate workgroups. Members who perceive that their workplace expects, supports, and rewards new ideas and approaches are likely to engage in more creative endeavors (Scott & Bruce, 1994). Moreover, group members may also adopt the behaviors expected within the workgroup climate to receive social approval from their peers (Dragoni, 2005; Schneider, 1975). Based on the above arguments, we propose the following hypothesis:

**Hypothesis 4 (H4):** Innovation climate level is positively related to employee creativity.

Taking Hypothesis 2 and 4 together, we propose the following hypothesis:

**Hypothesis 5 (H5):** Innovation climate level mediates the relationship between transformational leadership and employee creativity.

**Moderating Effects of Innovation Climate Strength**

Finally, we propose that the relationship between innovation climate level and employee creativity will depend on innovation climate strength. To illustrate, consider the workgroup where innovation climate level is relatively high, while climate strength is relatively low. In this case, group members with differing climate perceptions may feel alienated from the group (Ford & Seers, 2006; Klein et al., 2001). This divergence may lessen instrumental support both to and from these individuals, limiting the benefits of relevant personal knowledge and access to important informal communication networks within the organization. This consequence may particularly impact individual creative endeavors (even to those who perceive the climate as...
supporting creative behaviors), as the development and implementation of creative ideas requires ready access to information both within and outside of the workgroup as well as emotional support from others within the immediate workgroup (Jehn et al., 1999; Mumford et al., 2002). In contrast, the increased communication and knowledge sharing inherent to strong climates should enhance group members’ creative efforts in cases where the innovation climate level is high.

Moreover, the motivation to provide instrumental emotional support to one’s coworkers may increase in groups with high innovation climate strength, as individuals may perceive greater pressure to adapt behaviors to the shared climate and maintain harmony with one’s environment (Dragoni, 2005). Overall, the agreement on appropriate behaviors, values, and interaction patterns characteristic of strong climates should strengthen coworker instrumental support for individual work endeavors, including creativity, when the overall innovation climate level is high. Based on these arguments we offer the following hypothesis:

**Hypothesis 6 (H6):** Innovation climate strength moderates the relationship between innovation climate level and employee creativity. Specifically, the relationship will be stronger when climate strength is high than when climate strength is low.

Taking Hypothesis 5 and 6 together, we propose the following hypothesis:

**Hypothesis 7 (H7):** Innovation climate strength moderates the mediating effect of innovation climate level such that the mediation effect of innovation climate level is stronger among groups with high innovation climate strength than among groups with low innovation climate strength.

**Method**

Data were collected from a total of 181 employees comprising 33 teams in nine Chinese organizations, representing the electronics, automobile, health care, and information technology industries. Team members worked interdependently to develop, market, or provide specific products and services. Among the 33 teams represented, 39% were health care service providers, 38% were research and development specialists, and 23% were in other professional and technical services. The average number of employees from each team is 5.6, ranging from 2 to 10 employees. The average age was
27.3 years (SD = 5.89) and the average organizational tenure was 3.7 years (SD = 4.31). Sixty-eight percent were female, and over 99% had completed some college or held a university degree.

**Procedure**

Following the example of Conger, Kanungo, and Menon (2000), data were collected in two waves, with a lag of approximately 2 weeks in an effort to mitigate common-source bias. At Time 1, research assistants distributed the survey to 181 employees from 33 teams during planned team meetings, without the presence of the team leader. The employees completed questions regarding personal information, their team leader’s transformational leadership behaviors, and the innovation climate of their work team. At Time 2, the research assistants approached team members with a measure of employee creativity during a scheduled meeting, again without the presence of their team leader. Respondents were assigned a unique survey code so that we could match subordinates’ responses during both waves. To ensure confidentiality, respondents returned their completed surveys in a sealed envelope to a central collection box. Participants were also assured that their responses would be kept confidential and used only for research purposes. Data collection at both time periods occurred during normal work hours to maximize participation (which was effectively 100% for those present at the meetings). All measures were translated into Chinese using the translation and back-translation procedure described by Brislin (1970). After dropping nine cases due to missing data and two teams that did not have complete data for at least 75% of the team members, the final sample included 172 individuals representing 31 teams.

**Measures**

All measures were based on Likert-type response scales and, as described below, demonstrated adequate internal reliability and discriminant validity.

**Group-Level Transformational Leadership.** Team members assessed their immediate supervisor’s transformational leadership by using the Multifactor Leadership Questionnaire (MLQ 5X-short; Bass & Avolio, 2000), with a 5-point rating scale ranging from 1 (not at all) to 5 (frequently, if not always). Judge and Piccolo (2004) found a very high average correlation of .93 in meta-analysis after correction for unreliability among the four transformational leadership dimensions, thus empirically supporting their combination. Prior research has also suggested that the four dimensions of transformational
leadership did not show discriminant validity in predicting outcomes (e.g., Shin & Zhou, 2003). Therefore, consistent with prior research (e.g., Shin & Zhou, 2003, 2007), we averaged the 20 items ($\alpha = .94$) to create an index of transformational leadership.

**Innovation Climate Level.** We measured innovation climate using 16 items ($\alpha = .82$) from Scott and Bruce (1994)’s innovation climate scale. Evidence of reliability and validity has been reported in previous research (Jung, Chow, & Wu, 2003; Lee, Wong, Foo, & Leung, 2011; Sarros, Cooper, & Santora, 2008). On a 7-point scale from 1 (strongly disagree) to 7 (strongly agree), participants responded to questions such as, “Around here, people are allowed to try to solve the same problems in different ways.”

**Innovation Climate Strength.** Following Chan (1998), Colquitt and colleagues (2002), and Walumbwa, Wu, and Orwa (2008), we calculated the coefficient of variation (Allison, 1978) for each group by dividing the standard deviation of group members’ innovation climate perceptions by the group’s mean level. We then standardized the values and reversed the signs to generate a workgroup-level innovation climate strength variable. Higher values represent higher levels of strength.

**Group Demographic Diversity.** Consistent with prior research (Chatman & Flynn, 2001; Colquitt et al., 2002; Li & Hambrick, 2005; Randel & Jaussi, 2003; van der Vegt, van de Vliert, & Huang, 2005), we formed a composite measure of within-group demographic diversity. Age was measured as a continuous variable, while gender was measured as a simple dichotomy (1 = “male,” 0 = “female”). We followed Li and Hambrick’s (2005) approach to calculate group demographic diversity. First, we calculated Blau’s index of gender diversity for each group (Blau, 1977; Harrison & Klein, 2007) and the standard deviation of age within each group. Then we summed the standardized values of both scores to generate an index of group demographic diversity. Higher values represent greater demographic diversity within the group.

**Employee Creativity.** Employee creativity was measured using a modified version of the nine-item scale ($\alpha = .92$) developed by Tierney et al. (1999). We modified Tierney and colleagues’ (1999) scale by replacing “this employee” with “I” to reflect that the measure was self-reported rather than supervisor-reported. On a 5-point scale from 1 (strongly disagree) to 5 (strongly agree), the participants indicated how strongly they agreed with these statements about themselves. An example item included, “I try out new ideas and approaches to problems.” Self-reported measures of creativity similar to this
one have been used in previous studies examining the effects of the work environment on creativity (e.g., Amabile & Conti, 1999; Choi, 2007a; Kurtzberg & Mueller, 2005).

**Control Variables.** We controlled employee age, gender (male = 1, female = 0), and organizational tenure, as previous research has shown these variables to be related to creativity (Shin & Zhou, 2003, 2007). We included two group-level dummy variables (i.e., health care service providers and research and development specialists; other professional and technical services was the reference category) to control for the type of group tasks performed. In our multilevel analyses, we controlled individual-level psychological innovation climate in the Level 1 equation of the multilevel regression analyses used to test our hypotheses (described in the next section) to account for the possibility that individual employees may hold differing views of the work environment that could influence individual-level outcomes, despite significant agreement among group members’ evaluations of innovation workgroup climate (Dragoni, 2005). Finally, we controlled for average group age and average group gender (i.e., the proportion of male group members).

We estimated a confirmatory factor analysis (CFA) to verify the distinctiveness of our latent independent variables. To preserve adequate statistical power, we formed parcels to serve as indicators of the latent variables. Transformational leadership was modeled as a single factor, with each of the four dimensions serving as indicators. Innovation climate was modeled with three indicator parcels: two contained five randomly-assigned items, and one contained six. The CFA model displayed a good fit to the data ($\chi^2 = 28.44 \ [df = 13]$, GFI = .95, CFI = .98, RMSEA = .08). Modification indices indicated that model fit could not be improved by relaxing any of the constraints restricting indicators to load onto only one factor. All factor loading values were greater than .60.

**Level of Analysis and Analytical Approach**

We modeled transformational leadership as a group-level variable. This approach is consistent with recent theorizing and empirical findings that transformational leaders often direct behaviors toward the group as a whole (Bass, 1998; Hackman, 1992; Wang & Walumbwa, 2007), and is conceptually consistent with our theoretical model, which proposes that the effects of transformational leadership are transmitted through group-level variables. Applicable analyses supported this aggregation (Rwg = .81, ICC[1] = .21, ICC[2] = .60). The generally accepted cutoff values for these statistics are
Rwg > .70 (James, Demaree, & Wolf, 1984), ICC(1) > 0.06 (Bliese, 2000), and ranges from .60 (Glick, 1985) to .70 (Bliese, 2000) for ICC(2).

We treated demographic diversity as a group-level variable to describe the distribution of demographic differences among group members. Following previous research (Chan, 1998; Colquitt et al., 2002; Walumbwa et al., 2008), we modeled innovation climate level and strength as a group-level variable because conceptually it represented a shared or collective mental model (Hofmann, Morgeson, & Gerras, 2003; Kozlowski & Klein, 2000). Empirical analyses supported aggregation (Rwg = .89, ICC[1] = .18, ICC[2] = .55). While the ICC(2) value was somewhat lower than recommended, it was arguably not low enough to prohibit aggregation, given the relatively high Rwg and ICC(1) values and the strong underlying theoretical rationale for aggregation (Glick, 1985; Gong, Chang, & Cheung, 2010; Schneider, White, & Paul, 1998).

We used ordinary least squares (OLS) regression analyses to test Hypotheses 1 to 3, which contained Level 2 dependent variables (innovation climate level and innovation climate strength). We used hierarchical linear modeling with random intercepts (Raudenbush & Bryk, 2002) to test Hypotheses 4 and 5, which contained Level 1 dependent variables. Results from both OLS regression and hierarchical linear modeling were jointly used to test Hypothesis 6 and 7. As recommended by Hofmann and Gavin (1998), we used grand mean centering for both the Level 1 and Level 2 predictors.

We conducted an ANOVA, with employee creativity as the dependent variable and workgroup membership as the independent variable, to examine the hierarchical linear modeling analyses precondition that significant between-group variance is present (Hofmann, 1997). Results indicated significant between-group variance ($\chi^2_{(30)} = 65.82, p < .01$), accounting for about 17.9% of the variance in employee creativity.

**Results**

Table 1 summarizes the means, standard deviations, and zero-order correlations among variables at the individual level. Table 2 summarizes the zero-order correlations among variables at the group level.

Results of the OLS regression analyses ($n = 31$) are shown in Table 3. In the innovation climate strength regression model, group demographic diversity was not significantly related to innovation climate strength, so Hypothesis 1 was not supported. In the innovation climate level regression model, transformational leadership was significantly associated with innovation climate level ($\beta = .37, p < .05$), thereby supporting Hypothesis 2.
We added a second step to the innovation strength regression model that included an interaction term consisting of group demographic diversity × transformational leadership to test the moderated relationship proposed in Hypothesis 3. We centered both variables before creating the interaction term to reduce the effects of multicollinearity. The interaction term was significant (β = .38, p < .05). Using the procedure described by Preacher, Curran, and Bauer (2006), we plotted the interaction using cutoff values of one standard deviation above and below the mean for both workgroup diversity and transformational leadership. As seen in Figure 2, workgroup diversity was negatively associated with climate strength when transformational leadership was low; however, when transformational leadership was high, the relationship between workgroup diversity and climate strength became positive. Results of simple slopes analyses indicated that the positive slope associated with

<table>
<thead>
<tr>
<th>Table 1. Individual-Level Inter-Correlations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1. Employee creativity</td>
</tr>
<tr>
<td>2. Innovation climate</td>
</tr>
<tr>
<td>3. Employee gender</td>
</tr>
<tr>
<td>4. Employee age</td>
</tr>
<tr>
<td>5. Employee tenure</td>
</tr>
</tbody>
</table>

Note. n = 172. Gender was coded so that 0 = “female” and 1 = “male.”
*p < .05
**p < .01

<table>
<thead>
<tr>
<th>Table 2. Group-level Inter-Correlations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1. Innovation climate level</td>
</tr>
<tr>
<td>2. Innovation climate strength</td>
</tr>
<tr>
<td>3. Group diversity</td>
</tr>
<tr>
<td>4. Transformational leadership</td>
</tr>
<tr>
<td>5. Group gender</td>
</tr>
<tr>
<td>6. Group age</td>
</tr>
</tbody>
</table>

Note. n = 31. Gender was coded so that 0 = “female” and 1 = “male.”
*p < .05
**p < .01
high transformational leadership (= .66) was significant (t = 2.20, p < .05), but that while the negative slope associated with low transformational leadership (= −.59) approached significance (p = .10), it was not significantly different from zero. These results support the predictions made in Hypothesis 3 that transformational leadership mitigates the negative effect of workgroup diversity on climate strength; however, the form of the interaction differs from that described in the hypothesis in that the relationship between demographic diversity and climate strength was positive under high transformational leadership, as opposed to less negative. Finally, we note that the OLS models used to test Hypotheses 1 to 3 contained a high number of independent variables relative to the sample size. Supplementary analyses without the group mean age and group mean gender control variables yielded similar results.

To test Hypotheses 4 and 5, we used hierarchical linear modeling with intercepts as outcomes (Raudenbush & Bryk, 2002), in conjunction with the four-step mediation testing procedure described by Baron and colleagues (Baron & Kenny, 1986). Results of our hierarchical linear modeling analyses with individual creativity as the dependent variable are shown in Table 4. The

Table 3. Summary of OLS Regression Analysis Results.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Innovation climate level</th>
<th>Innovation climate strength</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D team</td>
<td>.25</td>
<td>−.20</td>
</tr>
<tr>
<td>Health care provider team</td>
<td>−.46*</td>
<td>.10</td>
</tr>
<tr>
<td>Mean group age</td>
<td>.05</td>
<td>−.13</td>
</tr>
<tr>
<td>Mean group gender</td>
<td>.26</td>
<td>.13</td>
</tr>
<tr>
<td>Predictor variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformational leadership</td>
<td>.37*</td>
<td>−.10</td>
</tr>
<tr>
<td>Group demographic diversity</td>
<td>.08</td>
<td>.15</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group demographic diversity × transformational leadership</td>
<td>.38*</td>
<td></td>
</tr>
<tr>
<td>Overall R² / ΔR²</td>
<td>.12</td>
<td>.07/ .07</td>
</tr>
<tr>
<td>Overall F</td>
<td>3.81*</td>
<td>3.83*</td>
</tr>
</tbody>
</table>

Notes. n = 31; Coefficients are standardized. Step 1 coefficients are from the reduced model. ΔR² represents change in R² for Step 2. R² values are adjusted.
*p < .05
**p < .01
first step in testing the mediation effect of innovation climate on employee creativity required a significant relationship between transformational leadership and employee creativity. This was not supported by our results from Model 1 in Table 4, where the regression coefficient associated with transformational leadership was not significant. Step 2 required that transformational leadership be related to the mediator (innovation climate level). This

Table 4. Summary of Hierarchical Linear Modeling Results.

<table>
<thead>
<tr>
<th>Level and variable</th>
<th>Employee creativity (M1)</th>
<th>Employee creativity (M2)</th>
<th>Employee creativity (M3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1: Control variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee age</td>
<td>.05(.01)**</td>
<td>.05(.01)**</td>
<td>.05(.01)**</td>
</tr>
<tr>
<td>Employee tenure</td>
<td>−.03(.02)</td>
<td>−.02(.02)</td>
<td>−.03(.02)</td>
</tr>
<tr>
<td>Employee gender</td>
<td>−.20(.14)</td>
<td>−.24(.14)</td>
<td>−.27(.14)*</td>
</tr>
<tr>
<td>Individual-level psychological innovation climate</td>
<td>−.10(.10)</td>
<td>−.16(.11)</td>
<td>−.16(.11)</td>
</tr>
<tr>
<td><strong>Level 2: Control variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R&amp;D team</td>
<td>.02(.20)</td>
<td>.09(.21)</td>
<td>.21(.19)</td>
</tr>
<tr>
<td>Health care provider team</td>
<td>−.13(.30)</td>
<td>.03(.31)</td>
<td>.26(.30)</td>
</tr>
<tr>
<td>Group age</td>
<td>−.02(.01)</td>
<td>−.02(.01)</td>
<td>−.03(.01)*</td>
</tr>
<tr>
<td>Group gender</td>
<td>−.06(.20)</td>
<td>−.16(.18)</td>
<td>−.20(.19)</td>
</tr>
<tr>
<td>Group demographic diversity</td>
<td>−.06(.05)</td>
<td>−.07(.04)</td>
<td>−.07(.04)</td>
</tr>
<tr>
<td><strong>Level 2: Predictor variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation climate strength</td>
<td>.20(.05)**</td>
<td>.22(.06)**</td>
<td>−.27(.09)*</td>
</tr>
<tr>
<td>Transformational leadership</td>
<td>.28(.17)</td>
<td>.15(.15)</td>
<td>.18(.13)</td>
</tr>
<tr>
<td>Innovation climate level</td>
<td>.41(.19)*</td>
<td>.49(.18)*</td>
<td></td>
</tr>
<tr>
<td><strong>Level 2: Two-way interaction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation climate level × strength</td>
<td>—</td>
<td>.28(.10)*</td>
<td></td>
</tr>
<tr>
<td>ΔR²</td>
<td>.13</td>
<td>.02</td>
<td>.02</td>
</tr>
</tbody>
</table>

Notes. Parameter estimates are unstandardized. Numbers in parenthesis are standard errors. ΔR² represents the increase in total error variance explained compared to the previous model. ΔR² for M1 represents the increase in total error variance explained compared to an intercept only model. Gender was coded so that 0 = “female” 1 = “male.”

*p < .05. **p < .01
requirement was supported by our results for Hypothesis 2. To test Step 3 and Step 4, we added innovation climate level to the analyses (see Table 4, Model 2). Step 3 was satisfied as the regression coefficient associated with innovation climate level was significant ($\gamma = 0.41, p < 0.05$). This result also supported Hypothesis 4, which predicted that innovation climate would be positively related to employee creativity. Finally, the regression coefficient associated with transformational leadership was not significant, thereby satisfying Step 4. Overall, these results support all of the steps described by Baron and Kenny (1986) except for Step 1, which Kenny and colleagues (Kenny, Kashy, & Bolger, 1998) subsequently suggested is not essential to establishing mediation. Thus, while noting the lack of support for Step 1, the overall results support Hypothesis 5 and indicate that innovation climate level mediated the relationship between transformational leadership and employee creativity.

Model 3 (M3) was the same as Model 2, with the exception of an added interaction term consisting of innovation climate level $\times$ innovation climate strength in the equation. The regression coefficient associated with the interaction term was significant ($= 0.28, p < 0.05$). Again, following Preacher et al. (2006), we plotted the form of the interaction effect. As seen in Figure 3, innovation climate level was more positively related to employee creativity in groups with high climate strength than those with low climate strength. Results of simple slopes analyses following the procedure described by
Preacher et al. (2006) indicated that the slope associated with innovation climate level (= .77) was significant when climate strength was high ($z = 3.24$, $p < .01$), but that it was not significant when innovation climate strength was low. Thus, Hypothesis 6 was supported.

Hypothesis 7 proposed that innovation climate strength moderates the mediating effect of innovation climate level in the transformational leadership and creativity relationship. According to Muller, Judd, and Yzerbyt (2005), moderated mediation exists when both $X \rightarrow$ Mediator effect and Mediator × Moderator $\rightarrow$ Y effect are significant simultaneously. The first requirement is met by our results for Hypothesis 2, and the second requirement is met by our results for Hypothesis 6. Using the approach recommended by Muller and colleagues (2005), we calculated the total indirect effects of transformational leadership on the creativity at values of innovation climate strength one standard deviation above (= .21) and one standard deviation (= .08) below the mean. The results indicated that the indirect effects were stronger when innovation climate strength was high than when it was low. These results support Hypothesis 7.

**Discussion**

The present study examined the relationships among group demographic diversity, transformational leadership, innovation climate level and strength,
and employee creativity. Our results indicated that transformational leadership was positively related to innovation group climate, which was, in turn, related to employee creativity. Our results also indicated that diverse groups tended to have a stronger innovation climate when transformational leadership was high and that innovation climate level was more strongly related to employee creativity when innovation climate strength was high. These results have both theoretical and practical implications.

Contrary to expectations, we did not find that group demographic diversity was significantly related to innovation climate strength in our direct effects model. If we had not subsequently tested the effects of the interaction of transformational leadership and group demographic diversity, we might have concluded that group demographic diversity was not related in any way to innovation climate strength. However, the significant interaction between transformational leadership and group demographic diversity suggests that when the transformational leadership of diverse workgroups is high, workgroup members are prone to greater consensus in climate perception. Our results provide possible explanations for extant inconsistent findings in the relation between group demographic diversity and climate strength. For example, Colquitt and colleagues (2002) found that group demographic diversity was associated with low procedural justice climate strength. However, neither Klein et al (2001) nor Ford and Seers (2006) found any significant relationship between group demographic diversity and within-group agreement on workplace perceptions. Overall, our finding suggests that transformational leadership may mitigate, and even reverse, the negative effect of group heterogeneity on climate strength.

Somewhat unexpectedly, our results indicated that innovation climate strength was higher when both workgroup diversity and transformational leadership were low than when diversity was low but transformational leadership was high, which resulted in a crossover interaction effect. This finding suggests that homogeneous groups may form greater consensus in the perception of innovative workplace climate when the leadership is less transformational. Perhaps people in homogeneous groups tend to perceive their work environment as less encouraging of creativity, as the group has fewer perspectives from which to draw. Low transformational leadership (and the associated lack of intellectual stimulation and inspirational motivation) may further reinforce group members’ perception of the workplace climate, thus resulting in a higher consensus in climate perception (i.e., high strength). In contrast, high transformational leadership in this case would contradict group members’ perception of workplace climate. These different, contradictory cues in the homogeneous groups may make consensus in climate perception more elusive, resulting in lower climate strength.
We extended the research on transformational leadership and creativity by delineating a contextual perspective on how transformational leadership relates to employee creativity. Previous research has focused primarily on how transformational leadership affects employee creativity by influencing employee self-concept (Shin & Zhou, 2003; 2007). Integrating leadership with organizational climate research, we proposed and found support for the notion that transformational leadership enhances employee creativity through its effects on the workplace climate. In addition, further examination of the results indicates that transformational leadership did not have any incremental effects on creativity after taking into account the effects of innovation climate level. These results indicate that the effects of transformational leadership on creativity were accounted for by organizational climate. Future research should include both employee self-concept and innovation climate to better understand precisely how transformational leadership affects individual creativity.

Finally, we found that innovation climate level was more strongly related to employee creativity when innovation climate strength was high. Our results are consistent with Colquitt and colleagues (2002), who found that procedural justice climate strength moderated the effects of procedural climate level. Conversely, both Walumbwa and colleagues (2008) and Lindell and Brandt (2000) failed to find notable moderating effects of climate strength in the relationship between climate quality and work related outcomes. Further research on the conditions in which climate strength displays effects similar to those observed in this study and those reported by Colquitt and colleagues (2002) is needed.

Our results have practical implications for human resource management. Our findings suggest that organizations concerned with enhancing creativity and innovation may benefit from focusing on the overall work environment and, further, suggest that managers who exhibit transformational leadership behaviors may contribute to a work environment favorable to employee creativity. According to Liao and Chuang (2007), organizations can facilitate transformational leadership by having open discussions with managers regarding transformational leadership behaviors, implementing role play based training, setting goals for using transformational leadership behaviors, and implementing mechanisms for direct employee feedback. Our results further suggest that development of transformational leadership behaviors may particularly serve diverse teams that are vulnerable to weaker climate strength without transformational leadership. Finally, we should point out that while our results were statistically significant, the total variance in individual creativity attributable to between-group variance was about 18%. Thus, approximately 82% of the variance was due to individual-level effects that were not the focus of our model.
Limitations and Future Research

The study has several important limitations that should be noted. First, the findings may be culturally bound. Given China’s strong collectivist culture (House, Hanges, Javidan, Dorfman, & Gupta, 2004), the respondents may have been more susceptible to influence by collective cognition, such as group-level innovation climate level and strength, than those from more individualistic cultures. In addition, age and gender difference may have particularly notable effects in China where seniority and males are both highly respected (Choi, 2007b; Hofstede, 2001; Tsui, Porter, & Egan, 2002). Additional research is needed to see if our results can be generalized across cultures.

Second, the cross-sectional portion of our data combined with the relatively short time lag between the data collection efforts limited our ability to make definitive conclusions regarding causality. Moreover, because all of our data, including the dependent variable, were collected through self-reported surveys, the results may have been affected by common-source bias. We attempted to control for this potential confound in two ways. First, we collected data at two different time points: the independent variables were all collected at Time 1 and the dependent variable (individual creativity) was collected approximately 2 weeks later at Time 2. Second, common method bias was minimized to a certain extent by the aggregation required to treat demographic diversity, innovation climate, and transformational leadership as group-level variables (Raudenbush & Bryk, 2002) and by the fact that group diversity was an objective measure. Future research using longitudinal design with multitrait/multimethod techniques would provide stronger validation of our results and the underlying model.

These limitations notwithstanding, the present study provides valuable contributions to our understanding of creativity by integrating diversity, leadership, and climate literatures and by increasing the generalizability of previous research findings from Western samples. While much remains to be learned about the complex relationship between leadership, context, group composition, and creativity, we hope our study will stimulate future investigation in this area.

Declaration of Conflicting Interests

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