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Group composition and employee creative behaviour in a Korean electronics company: Distinct effects of relational demography and group diversity

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Work group composition is one of the key variables that influence individual behaviour in a group setting. This study investigates the effect of individual-level dissimilarities (relational demography) as well as group-level membership heterogeneity (group diversity) on creative behaviour of individual employees. Multi-level analyses of data from 188 work units of a Korean electronics company showed that relational demography in terms of gender and hierarchical status and group diversity in hierarchical status and performance level were negatively related to employee creative behaviour. In contrast, relational demography in terms of age and performance level and group diversity in functional background increased creative behaviour. The results indicate that demographic composition variables have different individual- and cross-level effects on individual employees' creative behaviour. This study demonstrates the need for a multi-level approach to the study of organizational demography.

Recently, organizational scholars have identified creativity as a core employee capacity in organizations (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Oldham & Cummings, 1996; Zhou & George, 2001). Most studies of creativity in organizational settings have attended to contextual factors that either facilitate (challenging task, supportive supervision; Oldham & Cummings, 1996) or inhibit (rigid procedure, lack of autonomy; Shalley, Gilson, & Blum, 2000) individual creativity. The present study investigates the role of group composition as a contextual predictor of creative behaviour of employees in a group setting (Kurtzberg & Amabile, 2001).

In response to the increasing importance of the issue of diversity in organizations, scholars have examined the implications of membership heterogeneity with respect to creativity and innovation. Most studies in this line of research, however, have examined these relationships at the group level of analysis, attending to issues such as the demographic diversity of a group and its creative performance (e.g. Ancona & Caldwell,

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1992; Jehn, Northcraft, & Neale, 1999). For this reason, our understanding of how group composition affects individual creativity is quite limited. This gap is critical because, assuming that individual creativity is the basis of organizational innovations (Amabile, 1988), individual members' creative performance is a necessary predecessor of group creativity.

In a recent review, Jackson, Joshi, and Erhardt (2003, p. 803) framed the diversity issue as a phenomenon that involves dynamics at various levels including individual, dyadic relationships, teams/departments and the entire organization. They maintained that the organizational demography literature has increased our understanding of group- and organizational-level dynamics of diversity, while largely ignoring its role in shaping individual behaviour: 'feelings and behaviors of individuals can be shaped by the diversity of work teams, it is possible that dyadic interactions are shaped by both relational demography and team composition' (p. 819). In a recent meta-analytic review of 182 studies published between 1997 and 2004, Dionne, Randel, Jaussi, and Chun (2004) found that (a) only 19% of these published studies explicitly addressed the issue of level of analysis, (b) only 22% of empirical studies used proper measurement approaches 'by measuring concepts at the same level of analysis at which they were specified' (p. 202), and (c) none (0%) of the studies employed appropriate multi-level data analysis strategies (Dionne *et al.*, 2004). Given that many studies have conceptualized diversity as a multi-level phenomenon, the observation that none of these studies utilized proper multi-level analysis strategies in dealing with apparently multi-level phenomena and variables is quite surprising (Harrison & Klein, in press).

Responding to the need for more micro-level and multi-level approaches to the issue of diversity, the present study investigates individual- and cross-level processes involving group composition variables in predicting employee creative behaviour. Specifically, at the individual level, I conceptualize membership heterogeneity in a group by utilizing the concept of relational demography, which is defined as the extent to which a particular member is different from other members within the same work unit (Tsui, Egan, & O'Reilly, 1992). I also explore the effects of various group diversity characteristics on employees' creative behaviour. This study examines a common set of demographic variables including age, gender, tenure and functional background, but it also investigates the effects of variables that have rarely been included in the existing studies (Jackson *et al.*, 2003), such as hierarchical status and performance level of employees. This study thus significantly extends the organizational demography and creativity literature by revealing multi-level dynamics through which various demographic variables influence employee creative behaviour.

The multi-level hypotheses advanced in this study will be empirically tested using data collected from a division of a large Korean electronics company. Thus far, the organizational demography literature has been developed based on empirical data from Western countries, and cross-cultural validation of the diversity-related propositions in other cultural contexts has been very rare (see Pelled, Xin, & Weiss, 2001, for an exception). Given the collectivistic and hierarchical nature of Asian culture, including Korea (Hofstede, 2001), the effects of group composition variables on employee behaviour might be more pronounced and expressed in different directions in Asian countries. In addition to extending the literature with multi-level propositions, the present study also tests the cross-cultural generalizability of theoretical arguments of organizational demography in a new cultural context. Finally, drawing on a recent conceptual clarification by Harrison and Klein (in press), demographic diversity is defined as either *separation* in positions and values related to task-related issues or

variety in members' categorical backgrounds, but not as *disparity* in terms of unequal distribution of resources or power. These 'separation'-type diversity variables were operationalized as standard deviations (instead of coefficients of variation, which are appropriate only for 'disparity'-type diversity) as recommended by Harrison and Klein.

Hypotheses

The current outcome variable, *creative behaviour,* is defined as 'a behavioral manifestation of individual creativity that may lead to the generation of novel and useful ideas' (see Choi, 2004). This definition focuses on the *behavioural process* of generating a new idea or product, regardless of how it is evaluated by others afterwards. For example, to be creative in the workplace, employees may need to be sensitive about inefficient work methods, procedures and/or policies and create more efficient and effective ways to achieve a goal (Frese, Fay, Hilburger, Leng, & Tag, 1997). Scholars have used various labels to refer to this type of behaviour, including personal initiative, innovative behaviour, voice and taking charge (Frese *et al.*, 1997; LePine & Van Dyne, 2001; Morrison & Phelps, 1999; Scott & Bruce, 1994). This individual-level behavioural process of developing new ways of doing things may ultimately lead to creative outcomes for the individual (e.g. number of successful ideas) and the group (e.g. creativity of group decisions). This study proposes that this intermediate, behavioural outcome is shaped by group composition at multiple levels of analysis.

Relational demography

Organizational researchers have argued that demographic characteristics are a source of social context for individual behaviour (Zenger & Lawrence, 1989). At the individual level, employees compare their demographic characteristics with those of their colleagues in order to judge the extent to which they are different from or similar to others in the social unit. Based on theoretical concepts such as social categorization, social identity and the similarity-attraction paradigm, researchers have argued that relational demography (the difference or similarity of a person with respect to others) is a significant predictor of various work-related attitudes (Tsui *et al.*, 1992). Most field studies of relational demography have reported that being different from others has negative implications in regard to individual attitudes and behaviour, such as group cohesion, commitment, communication and citizenship behaviour (Riordan & Shore, 1997; Tsui, Porter, & Egan, 2002; Zenger & Lawrence, 1989).

Owing to the lack of empirical studies, the implications of relational demography with respect to creative behaviour are not clear. In a simulation-based study using MBA students as subjects, relational demography was positively related to creativity of TQM solutions (Chatman, Polzer, Barsade, & Neale, 1998). In this study, however, the relational demography measure was a composite measure that combined dissimilarities in nationality, race and gender, which rendered the source of the positive effect ambiguous. Although being different from others may be a source of new ideas, given that creative behaviour is a social process (e.g. expressing or sharing ideas with others, introducing changes to the existing task processes of the work unit), the potential of relational demography to disrupt the social process might substantially override its benefit as a source of fresh ideas. For instance, Tsui *et al.* (2002) reported that demographic dissimilarity in gender, race and age decreased the frequency of employees' suggestions for improving the organization. When employees feel that they

are surrounded by people with different backgrounds, it may be difficult for them to develop intimate relationships, be open-minded and feel free to suggest new ways of doing things (cf. evaluation apprehension; Paulus & Yang, 2000). Studies have shown that, under such conditions, individuals tend to be less creative (Amabile *et al.*, 1996).

To explain interactive processes, organizational demography researchers have largely depended on a similar set of theories including social categorization or identity and similarity-attraction paradigm, all of which suggest that individuals with greater similarity in their social backgrounds or demographic categories tend to identify, trust and interact more freely with each other (Williams & O'Reilly, 1998). These theories predict that practically any type of dissimilarity in social attributes of a person in comparison with his/her colleagues will impede this person's social integration, which effectively decreases his/her willingness to share new ideas or introduce change in work procedures that might result in further isolation within the group (LePine & Van Dyne, 2001). Janssen's (2003) study reveals that innovative behaviour, although it is beneficial for the organization, tends to produce negative social outcomes for employees in that it degrades their social relationships with the colleagues who resist the suggested changes.

In the present study, however, I propose that not every social attribute disrupts creative process at the individual level. The negative implications of being different on a particular social characteristic may depend on the extent to which it creates power differentials among individuals. Diversity researchers have used power or status differential to account for the effect of diversity (Jackson *et al.*, 2003). In fact, to interpret anomalies in empirical findings and to move beyond the rather simplified arguments based on similarity attraction, recent demography research has increasingly relied on power and status as a theoretical ground (e.g. Chatman & O'Reilly, 2004; Chattopadhyay, George, & Lawrence, 2004). The issue of power or status seems particularly relevant for understanding employees' creative behaviour if it is facilitated by psychological safety or no perceived threat of social repercussions for presenting different ideas (Anderson & West, 1998).

Scholars have proposed and reported confirming evidence that gender, race and age result in either high or low status and competence expectations of a particular individual (Chattopadhyay, 1999; Tsui *et al.*, 2002). In the present context of a Korean organization in which seniority is highly respected and often used as a point of comparison for developing the pecking order in the group (Hofstede, 2001), company tenure and age will operate to classify individuals into distinct social categories with differing status. In addition, given that Asian society has historically been male-dominated and that males have been ascribed with more dignity ('face') and social power (Tsui, 2002/2003), gender also signifies a meaningful source of status differentiation among members. Surprisingly, there has been no empirical investigation of whether or not dissimilarities in individuals' positions in the organizational hierarchy lead to distinct attitudes or behaviour. Given that a person's hierarchical status is the most apparent indicator of his/her power within the organization, dissimilarities in hierarchical position will hamper social integration of members and decrease willingness to share ideas that may not be accepted by others within the group. Thus, I hypothesize the following relationship.

> *Hypothesis 1.*   Being different from others in age, gender, tenure and hierarchical status will be negatively related to individual employees' creative behaviour.

In contrast to dissimilarities in age, gender, tenure and hierarchical position, employees' functional backgrounds may be relatively neutral in regard to status differentiation. Moreover, in contemporary organizations in which people work within a group of individuals with varied functional backgrounds, they expect each member to offer distinct insights or perspectives based on his/her functional background, which has been accepted as the precise reason for building cross-functional teams (Jehn *et al.*, 1999). Therefore, unlike dissimilarities in other demographic variables, dissimilarity in functional background may actually increase an individual's effort to be creative.

Level of performance is another individual difference variable that may enhance creative behaviour. Although different performance levels, as rated by supervisors, may be a potential source of status differentiation among group members, it is likely that employees who have been evaluated as performing either lower or higher than others in the same group will exhibit more creative behaviour than others. In a meta-analytic review of 607 studies, Kluger and DeNisi (1996) reported that there is a significant relationship between feedback and subsequent performance, and the sign of feedback intervention (FI) was not a significant moderator of this relationship: 'an FI is compared with a task standard, and effort is increased if the feedback sign is negative . . . a positive feedback sign may signal to the self that the focal task presents an opportunity for self-enhancement and leads to raising the standard for performance and consequently improving future performance' (p. 263). In organizations, employees who have received a lower than average performance evaluation will be strongly motivated to demonstrate to their peers and supervisors that they are competent. In contrast, higher-than-average performers may experience a boost in their job-related self-efficacy, which will increase their creative effort because they feel confident about their ability to contribute (Choi, 2004). Hence, being different in terms of performance level, either higher or lower than others, may lead to increased creative behaviour. Based on the above discussion, relational demography in function and performance level is expected to enhance creative contribution of employees.

> *Hypothesis 2.*   Being different from others in functional background and performance level will be positively related to individual employees' creative behaviour.

Work unit diversity

In addition to individual-level effects of relational demography on employee creative behaviour, the present study also proposes *cross-level* effects of work unit diversity on the same outcome. In analytical terms, this relationship proposes that group-level diversity measures significantly predict group-level variance of (or between-group variation in) creative behaviour of individual members (Bryk & Raudenbush, 1992). Thus far, there has been no direct empirical investigation of this cross-level relationship between diversity and creative behaviour. In the decision-making or information-processing framework, the prevailing way of thinking suggests that membership diversity entails benefits for the group, such as more and diverse information and viewpoints, richer discussion and more complete analysis of alternatives, all of which may provide fertile ground for members' creative efforts and ultimately lead to creative solutions from the group (Granovetter, 1973; Nemeth, 1986; Simons, Pelled, & Smith, 1999).

Nevertheless, group-level studies that have investigated the effects of various group diversity measures on group process and outcomes have provided only mixed support for the positive effect of group diversity on group creativity. In the strategic management

literature, studies based on top management teams have found that membership heterogeneity in terms of function, education and company tenure are positively related to innovativeness and the creative strategic initiatives of firms (Bantel & Jackson, 1989; Hambrick, Cho, & Chen, 1996). A number of other empirical studies, however, have shown that group diversity in gender, race and tenure is negatively related to team performance and innovation (Ancona & Caldwell, 1992).

Kurtzberg and Amabile (2001) identified the level and type of conflict among group members as a key mediator between group diversity and creative performance. If the group suffers from dysfunctional conflict such as emotional or relational conflict, and a lack of free exchange of ideas results (Jehn, 1997; Pelled, 1996), group members may become hesitant to engage in creative behaviour, which in turn will lead to reduced group creative performance. In contrast, task conflict tends to be functional because it is based on different goal perceptions, different perspectives or ideas and/or different preferences for alternative choices, all of which may lead to increased exchange of ideas and exploration of different viewpoints (Jehn, 1997).

Empirical studies (Jehn *et al.*, 1999; Pelled, Eisenhardt, & Xin, 1999) reported that informational diversity based on education and functional background induced task conflict, which in turn contributed to team innovative performance. In contrast, diversity in race, gender and tenure was associated with greater interpersonal conflict, which often leads to decreased team performance (Jehn *et al.*, 1999; Pelled *et al.*, 1999). Knight and colleagues' (1999) study also showed that top management teams' diversity in function and education increased variation in strategic orientation among executives, whereas tenure diversity decreased it. Moreover, social categories such as gender and tenure tend to generate strong divisions between in-groups and out-groups and result in negative interpersonal processes such as stereotyping and decreased interactions (Williams & O'Reilly, 1998). Similarly, diversity in hierarchical status delineates clear lines that *separate* members of a group from each other, impeding free contributions of ideas from the majority of members who occupy lower status positions, perhaps due to their fear of negative evaluation (Ambile, 1988; Paulus & Yang, 2000), which will in turn reduce the overall level of creative behaviour of a group.

In contrast to the negative implications of individual-level dissimilarity in age (Chattopadhyay, 1999), group-level studies have shown that age diversity can actually reduce conflict at the group level and increase members' satisfaction with and commitment to the group (Jehn *et al.*, 1999; Pelled *et al.*, 1999). Similarity in age provides a basis for a shared life history or cohort effect, which creates a feeling of camaraderie and comfort in sharing ideas. However, age represents stage of career development or life in general, and it is an attribute that is used for social comparison in terms of achievement (Chattopadhyay *et al.,* 2004), a tendency which is prevalent in the Korean context due to respect for seniority (e.g. working for a boss who is younger than oneself is a shame). Therefore, when a work unit is filled with members who are approximately in the same life and career development stage and thus compete for the same resources (e.g. leadership, promotion), they may be pressed to outperform each other. This performance pressure may drive group members to initiate new projects and suggest improved work methods and procedures because simply fulfilling in-role task expectations may not be sufficient in highly competitive situations (Morrison & Phelps, 1999). For this reason, age homogeneity at the group level may promote members' discretionary contribution to the work unit in areas such as creative behaviour (LePine & Van Dyne, 2001). Based on the above discussion, I hypothesize the following cross-level relationship.

Hypothesis 3. Work unit diversity in age, gender, tenure and hierarchical status of members will be negatively related to individual employees' creative behaviour within the work unit.

As mentioned previously, functional diversity of a group may result in informational or idea diversity, which may in turn promote creative behaviour of group members (Jehn, 1997). Empirical evidence related to functional background diversity has also shown that, in general, functional diversity increases group performance particularly in cognitive or decision-making tasks (Williams & O'Reilly, 1998). Thus, a work unit with greater functional diversity will stimulate more creative behaviour among its members. A group may also exhibit more creative behaviour when its members are heterogeneous in terms of performance level as evaluated by the supervisor. Compared with groups in which members receive approximately equal performance evaluations (high homogeneity), groups in which members are given unequal, differentiated performance evaluations (high heterogeneity) will engender competitive pressure and a performance-oriented climate for their members, which will in turn spur individuals to improve their performance (Kluger & DeNisi, 1996). In addition, members with different performance levels are likely to have different goal perceptions and perspectives with respect to how to perform the task, which will introduce additional variations in ideas and viewpoints. In summary, I hypothesize the following cross-level relationships.

Hypothesis 4. Work unit diversity in functional background and performance level of members will be positively related to individual employees' creative behaviour within the work unit.

Method

Data collection and sample characteristics

The present data were collected from a division of a large electronics company in Korea. The target sample included 6,594 division employees, of which 4,059 responded to the survey, which was administered through the company intranet (response rate = 61.6%). The response rate was comparable across different functions, gender, education, tenure and hierarchical levels.

The initial sample of 4,059 employees comprised 239 work units, which included project teams, functional departments and work teams in factories. Since this study aimed to examine the effect of group composition, work units with less than 3 participants ($N = 37$) and more than 50 participants ($N = 14$) were removed from the sample to ensure that members of the same group had a certain level of social influence on each other. This screening procedure produced the final sample of 2,993 employees from 188 work units. The number of participants from each work unit ranged between 3 and 50 with a mean of 15.92 ($SD = 11.93$) per unit. The demographic characteristics of this final sample ($N = 2,993$) were comparable to those of the initial sample ($N = 4,059$) in terms of age (33.21 vs. 33.09 years, respectively), gender (89 vs. 90% male), education (2.49 vs. 2.52 on a five-category scale) and tenure (9.51 vs. 9.23 years). The initial and final samples were also similar in functional background, including R&D (43 vs. 51%), production (27 vs. 26%), sales (11 vs. 9%) and support (10 vs. 8%). The composition of the final analysis sample was thus representative of the initial sample from which it was drawn.

Measures

The demographic variables were obtained from the company database at the time of collection of the self-report measure of creative behaviour. Each participant's performance level was based on his or her formal performance evaluation from the preceding year, which was provided individually to each employee 4 months before the time of this data collection.

Relational demography

The relational demography of each participant was computed by comparing the focal participant with all other members in the same work unit with respect to the following six characteristics: age in years, gender (0 = female, 1 = male), tenure with the company in years, hierarchical status (1 = entry level, 2 = associate, 3 = manager, 4 = executive), performance level (1 = poor through to 5 = excellent) and functional background (1 = R&D, 2 = purchasing, 3 = production, 4 = sales, 5 = support). In this study, relational demography scores were created by using a Euclidean distance (D) formula that has been adopted in previous studies (e.g. Chattopadhyay, 1999; Tsui *et al.*, 1992):

$$D = \left[\frac{1}{n}\sum (S_i - S_j)^2\right]^{\frac{1}{2}}$$

where S_i is a focal individual's value on a specific demographic variable, S_j is the value on the same variable for other members of the same work unit and n is the total number of respondents in the work unit. For example, in a four-person work unit with members who are 25, 30, 30 and 35 years old, the 25-year-old member's relational demography score was computed as: $\{1/4[(25-30)^2 + (25-30)^2 + (25-35)^2]\}^{1/2} = 6.12$; based on the same formula, the two 30-year-old members' score were 3.54. In the case of categorical variables (gender, hierarchical status, function), instead of conducting numerical subtractions, a score of zero was assigned when a focal member belonged to the same category as other members in the team and a score of 1 was assigned when a focal member belonged to a different category from other members. For example, in a unit with one female and three males, the gender dissimilarity score for the female member was $\{1/4[1 + 1 + 1]\}^{1/2} = .87$, whereas the score for the three male members was .50.

Work unit diversity

The coefficient of variation has been the most widely accepted and used measure of unit-level diversity in continuous variables such as age and tenure (Pfeffer & O'Reilly, 1987; Williams & O'Reilly, 1998). Harrison and Klein (in press), however, demonstrated that, unless researchers are interested in inequality or the level of concentration of resources within the unit (diversity as 'disparity'), the use of the coefficient of variation is misleading. In the present study, demographic diversity on continuous variables (age, tenure and performance level) is conceptually regarded as a variable in itself that separates members with respect to their positions or values regarding task goals and processes, and thus causes them to produce different ideas. In this study, therefore, I operationalize diversity on the three continuous variables as the unit-level standard deviation of a given attribute (Harrison & Klein, Guideline 4).

Quite often, however, the unit-level standard deviation of an attribute is affected by its unit-level mean, which makes it necessary to include the unit-level mean as a control variable when testing the diversity effect using the standard deviation (Harrison & Klein, Guideline 5; see Choi, Price, & Vinokur, 2003, for an example).

For the categorical composition variables (gender, hierarchical status, function), an approach suggested by Teachman (1980) and Pfeffer and O'Reilly (1987) was adopted, in which an entropy-based diversity index is calculated by the equation:

$$H = -\sum_{i=1}^{n} P_i(\ln P_i)$$

where i is a particular category, n is the total number of possible categories and P_i is the proportion of the members of the particular category within the group. For example, if we have two members from R&D, two from production and one from support, the functional diversity coefficient of this work unit is calculated as $-[.4 \times \ln(.4) + .4 \times \ln(.4) + .2 \times \ln(.2)] = 1.05$.

Creative behaviour
Adapting items from prior scales measuring employee creativity and innovation, I constructed a four-item measure ($\alpha = .84$) to assess participants' creative behaviour, which included 'I frequently come up with new ideas or new work methods to perform my task', 'I often suggest work improvement ideas to others' (adapted from Scott & Bruce, 1994), 'I often suggest changes to unproductive rules or policies' and 'I often change the way I work to improve efficiency' (adapted from Morrison & Phelps, 1999). Each item was followed by a five-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*). Since the present study is focused on predicting group-level variation of creative behaviour in addition to its individual-level variance, two indices were computed to determine whether creative behaviour represents a collective property of work units. Within-group inter-rater agreement averaged across work units (r_{wg}) was .91, indicating substantial agreement among members of a given work unit. Intra-class correlation (ICC) was .66, suggesting that members from the same work unit reported a more similar level of creative behaviour than did those from different work units (Bryk & Raudenbush, 1992).

Results

Tables 1 and 2 present means, standard deviations and correlations among the study variables at the individual and group levels of analysis, respectively. In addition to relational demography variables, Table 1 also includes the six demographic variables used to calculate relational demography scores. Similarly, Table 2 reports the raw demographic composition variables of each work unit (e.g. average age, proportion of females), along with diversity measures.

Analytic trade off of ordinary least square (OLS) regression and multi-level analysis
Virtually all previous studies of organizational demography have relied on single-level OLS regression analyses conducted either at the individual or group level of analysis

Table 1. Means, standard deviations, reliabilities and inter-scale correlations: individual level (N = 2,993)

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Work unit size	24.82	13.82	–												
2. Age	33.21	6.05	-.09	–											
3. Gender[a]	.11	.32	-.04	-.44	–										
4. Tenure	9.51	6.58	-.08	.78	-.27	–									
5. Hierarchical status[b]	2.34	.64	-.07	.79	-.38	.52	–								
6. Performance level	3.38	.76	-.06	.17	-.10	.12	.21	–							
7. Age dissimilarity	7.39	2.53	.03	.02	.25	.13	-.13	.06	–						
8. Gender dissimilarity	.34	.25	.02	-.40	.79	-.25	-.36	-.08	.30	–					
9. Tenure dissimilarity	7.48	2.46	.03	.09	.00	.17	.05	.04	.59	.04	–				
10. Hierarchical status dissimilarity	.69	.16	.15	-.14	.13	.02	-.22	.00	.51	.21	.34	–			
11. Performance level dissimilarity	.96	.38	.05	.19	-.07	.21	.13	.32	.05	-.06	.04	.11	–		
12. Function dissimilarity	.10	.21	.00	-.01	.12	.10	-.10	-.01	.12	.18	.00	.12	.07	–	
13. Creative behaviour	3.68	.63	-.08	.34	-.21	.30	.27	.11	.02	-.18	.03	-.06	.09	.03	–

Note. $r > .04$, $p < .05$; $r > .05$, $p < .01$; $r > .07$, $p < .001$.
[a] Gender (0 = male, 1 = female).
[b] Hierarchical status (1 = entry level, 2 = associate, 3 = manager, 4 = executive).

Table 2. Means, standard deviations and inter-scale correlations: group level (*N* = 188)

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Work unit size	15.92	11.93	—												
2. Average age	33.71	2.80	-.24	—											
3. Proportion of females	.12	.12	-.10	-.49	—										
4. Average tenure	9.80	3.48	-.11	.70	-.30	—									
5. Average hierarchical status	2.40	.28	-.25	.72	-.42	.19	—								
6. Average performance level	3.42	.28	-.24	.14	-.08	.02	.29	—							
7. Age diversity	5.69	1.59	-.08	-.15	.49	.09	-.31	-.05	—						
8. Gender diversity	.30	.22	.03	-.52	.89	-.28	-.47	-.10	.46	—					
9. Tenure diversity	5.69	1.43	-.04	-.02	.19	.09	.02	.01	.61	.19	—				
10. Hierarchical status diversity	.75	.24	.32	-.44	.27	.01	-.66	-.16	.50	.37	.27	—			
11. Performance level diversity	.73	.24	.03	.05	-.07	.09	.00	.28	-.07	-.02	-.03	.09	—		
12. Functional diversity	.10	.22	-.03	.07	.10	.22	-.08	-.06	.08	.09	-.07	.13	-.01	—	
13. Aggregated creative behaviour	3.72	.24	-.22	.50	-.18	.41	.35	.14	-.05	-.20	-.03	-.33	-.02	.11	—

Note. r > .15, p < .05; r > .19, p < .01; r > .25, p < .001.

(Dionne *et al.*, 2004). These OLS regressions have often included both demographic controls (e.g. age of a person, average age of the group) and group composition measures (e.g. age dissimilarity, age diversity). In the present multi-level analysis, it is also desirable to include raw demographic variables at both the individual and group levels of analysis. However, in this analysis based on hierarchical linear modelling (HLM), when I included raw demographic variables in the individual-level equation (or in the group-level equation), HLM's iteration process would not start because of high multicollinearity and the near singularity of the parameters to be estimated. HLM appears to be very sensitive to the issue of multicollinearity because it generates optimally weighted solutions through an iterative identification of the maximum likelihood function (Hofmann & Gavin, 1998). For this reason, in order to include raw demographic controls in the equation, single-level OLS regression analyses would need to be employed. However, given that a key innovation of the present study is the multi-level conceptualization and testing of multi-level dynamics of group composition effects, I deemed it preferable to adopt the multi-level analytic strategy, even though raw demographic control variables could not be included due to multicollinearity.

Before conducting multi-level analysis on the present data, I conducted two separate sets of OLS regression analyses on individual-level and group-level data that included both demographic controls and composition variables. The individual-level regression equation showed that age, tenure and performance level were positively related to creative behaviour, whereas female gender was a negative predictor of creative behaviour. Dissimilarities in age, hierarchical status and function were also significantly related to creative behaviour. The group-level regression indicated that average age, age diversity and hierarchical status diversity were significant predictors of unit-level aggregated creative behaviour (more detailed results are available on request). These separate regression analyses indicated that several of the raw demographic variables were significantly associated with creative behaviour. Considering the importance of the multi-level approach in the present context, however, the present analysis will be based only on group composition variables.

Multi-level hypothesis testing

To test the present multi-level hypotheses, I analysed the data using multivariate HLM (Bryk & Raudenbush, 1992), which is specifically developed to analyse data with a nested structure (e.g. individuals in groups). Unlike ordinary least square regression procedures, HLM partitions the total variance into multiple levels (in the present data, individuals and work units) and simultaneously estimates the effects of predictors that explain the variance at different levels (for a more detailed explanation of HLM procedures, see Hofmann & Gavin, 1998). In the present study, the total variance of individual creative behaviour was partitioned into individual-level and group-level variations. Relational demography variables were then entered into the individual-level equation to explain individual-level variation of creative behaviour. Similarly, work unit diversity indices were used to account for group-level variation of creative behaviour.

Although work units with more than 50 participants were excluded from the analysis sample to ensure that members had meaningful interactions, the present sample still included work units with varying sizes. It is possible that demographic composition variables have different implications for work units with different sizes because interactive dynamics among members are often affected by unit size (Choi *et al.*, 2003). To explore this possibility, as presented in Table 3, I conducted the same set of HLM

Table 3. Hierarchical linear models predicting creative behaviour

Predictors	Sample 1: Unit size ≤ 50 (2,993 individuals/188 units)			Sample 2: Unit size ≤ 30 (2,052 individuals/165 units)			Sample 3: Unit size ≤ 15 (961 individuals/116 units)		
	Null model	Model 1	Model 2	Null model	Model 1	Model 2	Null model	Model 1	Model 2
Age dissimilarity		.03***	.02**		.03***	.03**		.03**	.04**
Gender dissimilarity		−.56***	−.76***		−.55***	−.88***		−.35***	−.92***
Tenure dissimilarity		.00	.00		−.01	.01		−.01	−.02
Hierarchical status dissimilarity		−.31**	−.08		−.38***	−.13		−.51***	−.24
Performance level dissimilarity		.09**	.11**		.06*	.08*		.00	.07
Function dissimilarity		.08	−.17		.05	−.30		.07	.17
Work unit size			.00			.00			.00
Average age			.03**			.02*			.03*
Average tenure			.02*			.02**			.01
Average performance level			.06			.05			.03
Age diversity			−.01			−.02			−.05*
Gender diversity			.86***			1.03***			1.09***
Tenure diversity			.00			.01			.02
Hierarchical status diversity			−.21*			−.20			−.11
Performance level diversity			−.17*			−.15*			−.23*
Functional diversity			.23*			.34*			−.13
Individual-level variance (σ^2)	.3688	.3543	.3529	.3742	.3577	.3546	.3829	.3704	.3660
Change in variance ($\Delta\sigma^2$)		.0145	.0026		.0165	.0031		.0125	.0044
Proportion of explained variance		3.9%	.4%		4.4%	.8%		3.3%	1.1%
Group-level variance (τ)	.0222	.0197	.0034	.0218	.0206	.0050	.0131	.0117	.0045
Change in variance ($\Delta\tau$)		.0025	.0163		.0012	.0156		.0014	.0072
Proportion of explained variance		11.3%	73.4%		5.5%	71.6%		10.7%	55.0%

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

analysis using three different samples: (a) a current analysis sample with 188 work units with 50 or less participants per unit, (b) a subsample of 165 work units with 30 or less participants per unit and (c) another subsample of 116 work units with 15 or less participants per unit.

Table 3 presents the results of the multi-level equations that test the effects of relational demography and group diversity on creative behaviour. The null model with no predictors partitioned the total variance of creative behaviour into two levels: individual and work unit. Model 1 tested the individual-level effects of relational demography on creative behaviour. Model 2 examined the cross-level effects of work unit diversity variables on creative behaviour after controlling for the effects of relational demography measures. Similar to unstandardized regression coefficients in ordinary least square regression analysis, the coefficients from the HLM analysis appearing in Table 3 (β for individual-level predictors, γ for group-level predictors) can be interpreted as representing the magnitude of the effect of the predictors on the outcome, controlling for other variables in the equation. For each HLM model, individual- and group-level variances were identified, which were then used to calculate the amount of explained variance (equivalent to R^2) with additional predictors introduced to the model (Bryk & Raudenbush, 1992).

Relational demography

Hypothesis 1 states that individuals who are different from others in age, gender, tenure and hierarchical status will demonstrate less creative behaviour. This hypothesis was tested by Model 1 in Table 3. Consistent with Hypothesis 1, gender and hierarchical status dissimilarities were negatively related to creative behaviour ($\beta = -.56, p < .001$ and $\beta = -.31, p < .01$, respectively). The significant gender dissimilarity effect was due to the fact that females comprised only 11% of the present sample (thus high gender dissimilarity associated with females) and they reported significantly lower creative behaviour than their male counterparts (3.32 vs. 3.73, $t = 11.54$, $p < .001$). The significant effect of hierarchical status dissimilarity was based on the fact that entry-level employees reported significantly lower creative behaviour than managers (3.36 vs. 3.86, $t = 12.41$, $p < .001$). However, unexpectedly, age dissimilarity of a person relative to other members was positively associated with creative behaviour ($\beta = .03, p < .001$). This finding may have been caused by the fact that older employees (one standard deviation or more above the average age of the group) reported substantially more creative behaviour than members of average age (3.94 vs. 3.68, $t = 9.07, p < .001$). The empirical patterns involving age, gender and hierarchical status were almost identical across the three different subsamples that included work units with 50, 30 and 15 participants or less, respectively (see Table 3). In summary, the hypothesized negative effects of relational demography on creative behaviour were supported for two demographic characteristics: gender and hierarchical status.

According to Hypothesis 2, being different in terms of performance level and functional background will increase an individual's creative behaviour. Of the two, only performance level dissimilarity increased creative behaviour in subsample 1 ($\beta = .09$, $p < .01$), although it became less significant in subsample 2 ($\beta = .06, p < .05$) and insignificant in subsample 3 ($\beta = .00$, *ns*). As expected, low performers (one standard deviation or more below the average) reported significantly higher creative behaviour than average performers (3.74 vs. 3.65, $t = 2.10, p < .05$). The difference between high and average performers was also significant (3.83 vs. 3.65, $t = 5.79$, $p < .001$).

Apparently, both positive and negative deviations from average performance stimulate individuals to exert greater creative effort in the workplace. In summary, positive effects of relational demography on creative behaviour were observed in two attributes: age and performance level.

Group diversity

Hypothesis 3 proposes that members of a group characterized by greater diversity in age, gender, tenure and hierarchical status will exhibit less creative behaviour. Model 2 in Table 3 tests this cross-level relationship, controlling for the effect of group size based on the number of participants in the work unit as well as average levels of age, tenure and performance level of each unit (Harrison & Klein, in press). Both average age and average tenure were positively related to unit members' reported creativity ($\gamma = .03$, $p < .01$ and $\gamma = .02, p < .05$, respectively). The present analysis shows that, controlling for the effect of average age, age diversity was either an insignificant (in subsamples 1 and 2) or a negative predictor of creative behaviour (in subsample 3, $\gamma = -.05$, $p < .05$). After controlling for the effect of average tenure, tenure diversity (operationalized as unit-level standard deviation) did not show any significant effect. However, supporting Hypothesis 3, group-level diversity in hierarchical status was negatively related to members' creative behaviour within the work unit ($\gamma = -.21$ $p < .05$), although this result was significant only in subsample 1.

Contrary to the hypothesis, gender diversity was positively related to the overall level of creative behaviour of the group ($\gamma = .86, p < .001$), a pattern which was consistent across three analysis samples representing work units of different sizes. However, this positive effect of gender diversity should be interpreted with caution because, in terms of zero-order correlation, it was negatively correlated to creative behaviour of the group ($r = -20, p < .05$). The opposite signs associated with the regression coefficient and the zero-order correlation indicate the presence of a suppression situation (Tzelgov & Henik, 1991). Based on the results, it can be argued that, after controlling for all the other diversity variables and its individual-level effect, the 'pure' cross-level effect of gender diversity on creative behaviour is positive. Nevertheless, it is still not clear whether this pattern warrants a substantive interpretation or whether it is simply a statistical artifact. This pattern, therefore, will be regarded as an indication of potential effects rather than as a significant finding.

Hypothesis 4 suggests positive effects of group diversity in functional background and performance level on members' creative behaviour. Confirming this hypothesis, functional diversity had a significant positive effect on group-level variation in creative behaviour ($\gamma = .23, p < .05$), although it was insignificant only in the third subsample, which was composed of smaller work units. Unexpectedly, performance level diversity consistently decreased creative behaviour of group members ($\gamma = -.53, p < .05$) in all three subsamples. This pattern suggests the possibility that heterogeneity in performance level induces completely opposite dynamics at the individual and group levels of analysis.

In summary, the current analysis provides mixed support for the present hypotheses. In terms of relational demography, three of the six hypothesized relationships were significant and in the predicted direction (dissimilarities in gender, hierarchical status and performance level). In terms of group diversity, three of the six relationships hypothesized were also significant and in the predicted direction (diversity in age, hierarchical status and functional background). At both levels of analysis, however, there

were predictors that were significant but in directions that were opposite to those hypothesized (i.e. age dissimilarity and performance level diversity).

Discussion

Group composition is one of the key contextual factors that may influence individual creative processes (Kurtzberg & Amabile, 2001). Extending previous studies, which have largely focused on single-level effects of group composition on group creative performance (Ancona & Caldwell, 1992; Jehn *et al.*, 1999), this study investigated its effect on individual members' creative behaviour. This study has also expanded the organizational demography literature by examining the role of group composition as a multi-level predictor of employee behaviour. This multi-level approach to organizational demography provides distinct insights that cannot be obtained from single-level studies. In addition, adopting Harrison and Klein's (in press) recommendations, the present operationalizations of diversity and statistical tests of its effect were consistent with the conceptualizations of the current demographic variables as the source of separation of members' perceptions and positions or of variety in information and viewpoints. Below, I discuss the theoretical implications, practical significance and limitations of the current findings.

Theoretical implications

The present results show that being different from others in terms of gender and hierarchical status decreases a person's creative behaviour. In the present data, this negative effect was particularly strong for females who were in a minority position and for lower status members who were clearly in a low-power situation. Dissimilarities in gender and hierarchical status may have imposed a distinctly potent social barrier for these minority members that made them reluctant to share ideas with others (see Zenger & Lawrence, 1989), perhaps because suggesting changes or new perspectives often incurs social costs for the individual such as social isolation or degraded relationships with others (Paulus & Yang, 2000). The females and lower status members in this sample may have been discouraged from expressing new ideas or introducing changes in work methods due to the fear of negative evaluations from higher status members (Paulus & Yang, 2000) and, additionally, may have lacked the autonomy or discretionary power to do so (Amabile *et al.*, 1996). In contrast, high status members are relatively free of evaluation apprehension and may even feel responsibility to initiate new activities and changes, particularly when they are senior or in a managerial position. The significance of power or status differentiation could be further intensified in the present data, which were collected in a Korean organization, a context often characterized by respect for seniority and the general acceptance of high power distance in social relationships (Hofstede, 2001).

In contrast, dissimilarities in age and performance level were positively related to individual creative behaviour. A follow-up analysis indicated that the positive effect of age dissimilarity was largely due to the substantially higher level of creative behaviour reported by members who were older than their peers in the work unit (3.68 vs. 3.94). Given that the mean age of the present sample was approximately 33 years, increasing age might reflect increasing organizational experience, skills and power to initiate changes, all of which may promote creative behaviour. However, in the case of performance level dissimilarity, both low and high performers showed a greater level

of creative behaviour than average performers. This pattern may reflect different levels of motivation for low, average and high performers in organizations. It is likely that high-performing employees are more highly motivated from the outset and have high levels of self-efficacy due to their high performance (Kluger & DeNisi, 1996). On the other hand, employees who receive lower performance evaluations will feel a need to 'catch up' and are therefore also likely to be more motivated than their average-performing peers.

In the cross-level model, functional diversity was positively related to members' creative behaviour within the unit. Complementarity of skills or expertise among members may stimulate fresh ideas and facilitate creative behaviour of group members (for a review, see Williams & O'Reilly, 1998). However, work unit diversity in hierarchical status decreased members' creative behaviour. When the group is diversified in terms of hierarchical status, members may quickly establish a robust social order or significant power differentials among members, which stifle creative ways of thinking (Amabile *et al.*, 1996). Although diversity in hierarchical status might be a source of different perspectives and experience (Granovetter, 1973; Nemeth, 1986), it also substantially disrupts interpersonal dynamics by increasing communication difficulty and conflict (Pelled *et al.*, 1999; Smith *et al.*, 1994), which may keep group members from expressing untested ideas.

An interesting pattern emerges when we compare the results of relational demography and group diversity. Of the six demographic composition variables, hierarchical status was the only variable that showed consistent effects at both levels of analysis, exerting significant negative effects on creative behaviour (see Table 3). Age was a significant positive predictor at the individual level, but had either an insignificant or a negative cross-level effect on members' creative behaviour. Gender dissimilarity was negatively related to creative behaviour but gender diversity was positively associated with the same behaviour. Although the positive effect of gender diversity could be due to statistical suppression (Tzelgov & Henik, 1991), it is also possible that a small number of females (as in the present sample) in a group could facilitate social interaction among members, given that all-male groups tend to suffer from strict task orientation and low group commitment (Chatman & O'Reilly, 2004). Functional diversity exerted positive cross-level effects on creative behaviour but functional dissimilarity produced no significant result. Interestingly, dissimilarity in performance level was positively related to creative behaviour ($\beta = .09$, $p < .01$), but performance-level diversity was a negative predictor of the same outcome ($\gamma = -.17$, $p < .05$). It appears that the positive motivational potential of differentiated performance feedback for each individual member can actually impair group-level dynamics, perhaps by creating detrimental within-group competition among members. Apparently, a given demographic variable may vary in salience or meaningfulness at different levels of analysis, and hold different implications for individual behaviour and group-level dynamics.

These contrasting patterns clearly demonstrate that the same or similar constructs at different levels of analysis constitute structurally distinct variables, and that their effects cannot be generalized from one level to another (Morgeson & Hofmann, 1999). Choi *et al.*'s (2003) study offers an empirical demonstration that various group-process variables (e.g. leadership, climate) produce different effect patterns depending on whether they are operationalized as an individual- or group-level variable. In the organizational demography literature, there has been a clear separation between individual-level and group-level investigations, each focused on relational demography and group diversity, respectively (Dionne *et al.*, 2004; Jackson *et al.*, 2003). The present

results suggest that we may not be able to generalize findings from one level to another because the key demographic variables may not be the same at different levels, and because the same variable may play disparate roles, exerting sometimes opposite effects at different levels of analysis. To reveal these idiosyncratic dynamics that characterize different levels, future organizational demography research may need to utilize relevant multi-level research design and analytic strategies.

Practical implications

In a practical sense, the present findings suggest that work unit composition deserves careful consideration, particularly in light of the possibility that the same demographic characteristic has different implications for individual- and group-level processes. To promote individual creative behaviour, it might be beneficial to form teams with less power differentials among members by putting together individuals with similar levels of hierarchical status. Assigning members who are different in their functional background to the same team may also facilitate creative process in the group. However, the implications of performance levels of members and performance feedback are more complex. The level-dependent effects of the present demographic composition variables imply that the group composition decision may also depend on the relative importance of individual, relatively independent creative efforts vs. collaborative or group-level processes with respect to successful completion of the creative tasks (Kurtzberg & Amabile, 2001).

Study limitations and future research directions

Several limitations need to be considered. First, the present findings were based on an incomplete data set representing only 62% of the entire sample. Using computer simulations, Allen, Stanley, Williams, and Irwin (2005) demonstrated that empirical results involving the effects of relational demography variables on individual outcomes can change depending on the rate of participation as well as the pattern of subgroup representations. According to Allen *et al.*, the estimation of effect coefficients becomes biased when it is based on a smaller proportion of the entire sample (low response rate) or when a particular demographic subgroup is either underrepresented or over-represented (e.g. lower response rate of older workers than that of younger workers). Allen *et al.*'s study consistently revealed that low response rates 'result in *underestimation* of true dissimilarity effects' (p. 13). Thus, in the present analysis, the results based on the partial data set may be regarded as an underestimation of true relationships, and the significant findings in this study would probably be more significant if the complete demographic data were available. Nevertheless, a rigorous empirical test of the relationship proposed in this study could be achieved with more representative data based on a higher response rate or complete demographic information on all unit members from company records. Another caveat raised by Allen *et al.*'s study is that it is possible for within-group response rates of each subgroup in the sample to vary substantially, a phenomenon that may further bias the results. Therefore, organizational demography researchers should be sensitive to both sample-level and group-level response rates.

Second, owing to the high sensitivity of HLM to multicollinearity issues, I was not able to include raw demographic controls in the present multi-level analyses. This omission of control variables could be a critical problem given that previous studies of organizational demography have often included demographic controls to

separate the effects of composition from those of raw demographic characteristics. In the case of two OLS regression equations conducted separately at the two levels of analysis, demographic control variables were included in the equations. However, in this case, the individual-level regression results were statistically biased because statistical and empirical interdependence of members from the same team was not controlled for (this is also a critical limitation of previous studies of relational demography; Dionne *et al.*, 2004). The group-level regression results were also biased in that individual-level variations of creative behaviour within the same work unit were ignored (Hofmann & Gavin, 1998). The current situation seems to indicate a trade off between the two analytic strategies, each with its distinct strengths and weaknesses. It would be ideal, of course, if researchers could adopt multi-level analysis and be able to include both demographic controls and group composition variables that are highly correlated to each other. Organizational demography researchers should always be aware of this analytic trade off when designing and implementing their research.

Finally, the current outcome was self-reported creative behaviour, which might be systematically different from third parties' ratings. Given that the predictors were based on objective demographic characteristics, the problems associated with same source bias may not operate in the present analysis. However, it is still possible that the individual-level relationships involving relational demography might be more pronounced than when the outcome is based on third party ratings of creative behaviour. This is because individuals' response patterns could be affected by their perceptions of the demographic context, which reflects the objective demographic context (Hobman, Bordia, & Gallois, 2004).

Nevertheless, this study significantly extends the creativity literature by investigating how the creative process in a group can be shaped by its demographic composition. It also contributes to the organizational demography literature by examining previously unexplored demographic factors (e.g. hierarchical status and performance level) and revealing distinct level-specific dynamics of group composition variables. In terms of theoretical development, to understand better the differentiated effects of various individual characteristics, we need a more fine-grained theoretical approach to the issue of group composition than has been conventionally used in the organizational demography literature. In particular, whereas the negative effects of membership heterogeneity can be explained by prevailing theories such as similarity attraction or self-categorization (Riordan & Shore, 1997), its positive effects may require additional theoretical constructs such as power relationships, distribution of information and socially driven motivation of organizational members.

In terms of empirical development, organizational demography researchers need to validate further their arguments in other cultural contexts. Along with Pelled *et al.* (2001), the present study is one of the few studies that have tested the effect of organizational demography in a non-Western context. As Williams and O'Reilly (1998) pointed out, the meaning of a given demographic characteristic and social implications of a particular demographic category are linked to many factors including national, cultural and temporal contexts. Therefore, the relational meaning of demographic characteristics may be different for people from different cultures. A study integrating samples from different cultures and industries would broaden our understanding of this issue. Finally, cross-level interaction between composition variables observed at different levels of analysis (e.g. relational demography and group diversity) would be a potentially fruitful subject of future research.

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