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Group Personality Composition and Performance in Military Service Teams

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A field study of intact military teams tested hypotheses about group personality composition on conscientiousness and agreeableness. Members of 47 intact military service teams completed questionnaires assessing individual personality traits, and their supervisors rated team performance. Group average agreeableness and conscientiousness correlated positively with group performance ratings, as did the group minimum score for both traits. Variance for group agreeableness correlated negatively with group performance. Groups with high scores on both conscientiousness and agreeableness received higher performance ratings than all other group compositions, pointing to the possibility of synergy of complementary, collective personality traits in work teams. Results carry implications for theory, application, and future research.

As work teams become more widespread in today's organizations (Lawler, Mohrman, & Ledford, 1998), industrial–organizational psychologists seek to

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identify the factors in their success (Cohen & Bailey, 1997; Nielsen, Sundstrom, & Halfhill, in press). Empirical research on work team effectiveness, which encompasses both performance and viability (Sundstrom, 1999), has identified key predictors, including group personality composition (Sundstrom, McIntyre, Halfhill, & Richards, 2000). To date, however, evidence concerning predictors of effectiveness has generally involved just one or two types of teams, leaving open the question of whether certain predictors apply in other types of teams and, eventually, whether some predictors apply across all types of teams.

In this study we examine group personality composition variables as predictors of effectiveness in military service teams. Military service teams, like other types of work teams, consist of interdependent collections of individuals who share responsibility for specific outcomes for their organizations (Sundstrom, DeMeuse, & Futrell, 1990) and, like many other kinds of military teams, may incorporate specialized, complementary roles for individual members (LePine, Hollenbeck, Ilgen, & Hedlund, 1997). Group personality composition refers to the mix of group members' individual traits, as reflected in group-level indexes such as average, minimum, maximum, or variance on such traits as individual agreeableness or conscientiousness (Barrick, Stewart, Neubert, & Mount, 1998).

RESEARCH ON PERSONALITY COMPOSITION AND WORK GROUP EFFECTIVENESS

Early research found no consistent link between group personality composition and group performance (Heslin, 1964; Mann, 1959). Evidence of a connection remained sparse through the 1980s (Driskell, Hogan, & Salas, 1988; Moreland & Levine, 1992), when relevant empirical research benefited from four advances. First, the Big Five model (Costa & McCrae, 1988; Digman, 1990; McCrae & Costa, 1988) brought consistency to the conceptualization and measurement of personality. Second, research on the Big Five traits linked personality with individual performance (Hough, 1992). Third, researchers clarified the requirements for group-level analysis and adopted conventions for aggregating individual data into group indexes (Moritz & Watson, 1998), relying on r_{wg} (James, Demaree, & Wolf, 1984) and/or ICC (e.g., Campion, Medsker, & Higgs, 1993). Fourth, researchers distinguished group-level indexes of members' personality mix, reflecting the collective *level* of a trait, such as the group average or minimum, and the collective *diversity* on a trait, such as the group variance or range (e.g., Barrick et al., 1998).

Research on work team effectiveness and personality composition in the 1990s found promising links involving several of the Big Five personality traits, especially the two on which this research focuses: conscientiousness and agreeableness.

Conscientiousness and Group Effectiveness

Field studies of individual job performance linked it with the conscientiousness trait (Barrick, Mount, & Strauss, 1993; Hough, 1992), which includes such personal characteristics as orderliness, dependability, attention to detail, self-discipline, and preference for structure. In a work group, a high collective level of conscientiousness may manifest at the group level as shared attention to accuracy, timing, and follow-through, especially within groups homogeneously high on the trait. In work involving specialized roles or coordinated subtasks (or, in terms of Steiner & Vannoy, 1966, and Steiner, 1972, “complementary” or “additive” tasks), collective performance may depend on the sum or average of members’ abilities. Consistent with these ideas, Barrick et al. (1998) found average conscientiousness in 51 manufacturing and maintenance teams positively correlated with supervisor-rated performance. Similarly, Neuman, Wagner, and Christiansen (1999) studied 82 retail service teams and found group average conscientiousness positively correlated with supervisor-rated performance.

Several field studies found work teams’ performance positively correlated with the groups’ lowest, or minimum, scores on conscientiousness, including the study by Barrick et al. (1998). Later, Neuman and Wright (1999) found minimum conscientiousness scores in 79 human resource service teams positively correlated with an objective index of work accuracy and to supervisor- and peer-rated performance. Similarly, in a study of 76 manufacturing teams, Neuman (2000) found both an objective index of work completion and supervisor-rated performance positively related to groups’ lowest conscientiousness scores. These teams’ work probably incorporated some elements that operated as “conjunctive” tasks (Steiner, 1972; Steiner & Vannoy, 1966), which require all members to achieve a minimum standard. Groups’ “weakest links,” the least conscientious members predisposed to pay the least attention to detail, may have had disproportionately prominent, adverse roles in teams’ performance, and their more conscientious teammates may have been unable to compensate.

A second, possible reason why team performance correlated with team minimum conscientiousness concerns conflicts stemming from team diversity, or personality clashes. In teams with wide differences in members’ conscientiousness, the more orderly, detail-oriented, deadline-conscious members may come into conflict with less conscientious members, as suggested by research on group diversity (Jackson et al., 1991; Moreland & Levine, 1992). If so, the time and effort spent by diverse teams resolving personality conflicts or in managing tensions from unresolved conflicts may detract from performance. Support for this idea comes from Barrick et al. (1998), in which team conflict correlated inversely with group minimum conscientiousness—the lower the minimum conscientiousness score, the more conflict occurred. However, the team’s minimum score reflects both level and diversity on the trait.

A pure index of team diversity—group variance on conscientiousness—correlated inversely with team performance in the Barrick et al. (1998) study. In contrast, Neuman et al. (1999) found team variance on conscientiousness unrelated to team performance, possibly because the teams were more homogeneous on conscientiousness. Only in relatively heterogeneous teams should team variance on conscientiousness or team minimum score correlate with conflict. In more homogeneous teams, the range of variance scores is restricted, and team minimum and maximum scores resemble team averages.

The only study of work teams to report group maximum conscientiousness scores found them unrelated to team performance (Barrick et al., 1998). The work of the manufacturing and maintenance teams in this study may have included elements that functioned as “disjunctive” tasks (Steiner, 1972) in which group performance hinged on conscientiousness-related abilities of the most able member. However, teams’ performance may have depended more on joint efforts (as in Steiner & Vannoy’s, 1966, complementary tasks), where group performance may reflect the sum (or product) of members’ abilities.

Extending prior findings about collective conscientiousness to military service teams suggests that group composition on this trait has greatest relevance to work performance, especially criteria that call for accuracy, attention to detail, timely coordination, and dependable follow-through. We adopted the following hypothesis for our study:

1. Military service team overall performance, and performance concerning timeliness, accuracy, and output, correlate (a) positively with group average and minimum conscientiousness, and (b) inversely with group variance on conscientiousness.

Agreeableness and Group Effectiveness

Research on individual job performance has linked it with the agreeableness trait (Frei & McDaniel, 1998; Hough, 1992), which includes personal characteristics such as empathy, humility, willingness to cooperate, altruism, and concern for others. However, this finding is not consistent, as some researchers (Barrick & Mount, 1991) did not find individual agreeableness related to individual performance. At the group level, collective agreeableness may translate as cooperation, consensus orientation, and effective conflict management. Group average agreeableness may be expected to correlate with group cohesion, viability (members’ motivation to remain with their team in the future), and performance of work that requires effective handling of interpersonal relationships with customers, suppliers, managers, and others—at least in teams homogeneous enough on agreeableness to avoid personality-related conflicts.

Barrick et al. (1998) found group average agreeableness in manufacturing and maintenance teams positively correlated with performance and cohesion and inversely correlated with team conflict, but it was unrelated to team viability. Neuman et al. (1999) found group average agreeableness positively correlated with supervisor-rated performance in retail service teams.

Neuman and Wright's (1999) field study of service teams found group minimum agreeableness positively correlated with supervisor- and peer-rated performance. Two studies of manufacturing teams also found group minimum agreeableness positively correlated with supervisor-rated performance and with team cohesion (Barrick et al., 1998; Neuman, 2000). In the Barrick et al. study, minimum agreeableness also showed a strong, inverse correlation with team conflict, suggesting that the lower the agreeableness of the team's least agreeable member, the more conflict the team experienced.

Group diversity on the agreeableness trait, indicated by group variance, correlated inversely with team performance in the Barrick et al. (1998) study and inversely with workload sharing. However, group variance on agreeableness was unrelated to performance in the Neuman et al. (1999) study of retail service teams, which might have had relatively homogeneous, high agreeableness.

Research on collective agreeableness suggests that composition on the trait carries importance for group cohesion and viability and for performance involving maintenance of interpersonal relationships with customers or others. We adopted the following hypothesis for our study:

2. Military service teams' relationship-focused performance correlates (a) positively with group average and minimum agreeableness, and (b) inversely with group variance on agreeableness.

Combination of Traits and Synergy

Possible "synergy" bonuses in work groups (Hackman, 1987) involving personality composition may occur with the combination of complementary traits. Collective conscientiousness and agreeableness potentially complement one another. If collective agreeableness promotes group viability, cohesion, and service relationships, and if collective conscientiousness promotes timely and accurate performance, groups that combine both may be unusually effective. Partial support for this idea comes from research that shows a consistent, positive relationship of cohesion and performance (Mullen & Copper, 1994). The correlation could even reflect a positive spiral in which good performance boosts cohesion, which motivates better performance, which further enhances cohesion, and so on.

Applying this idea to military service teams, we adopted the following hypothesis:

3. Military service teams high in both conscientiousness and agreeableness, compared with all other military service teams, have higher performance ratings.

METHOD

Research Design

In a field study of 47 intact military teams, members completed questionnaires assessing conscientiousness and agreeableness. Performance was measured via supervisor ratings.

Setting

The study took place in the southeastern United States at an Air National Guard base with approximately 1,000 employees, in which members of service teams cooperate to perform such tasks as vehicle maintenance, equipment repair, flight operations, training design, training delivery, and evaluation. Each team reports to a supervising officer or noncommissioned officer.

Participants

There were 422 participating team members, of whom 89% were male, 41% worked as full-time employees, and 11% held rank as officers. Participating teams ranged from 3 to 14 members, with an average of 5.2, and represented 35 different departments or shops throughout the organization.

During two monthly, weekend drill sessions, 1,040 surveys and rating forms were distributed to team members and supervisors. A total of 620 surveys and 645 rating forms were returned, for response rates of 60% and 62%, respectively. Of these, 422 were matched with an appropriate supervisor rating form to qualify for inclusion in the study. Supervisors ($n = 147$) averaged 2.9 ratings each. The number of individuals rated per supervisor ranged from 1 to 14.

Procedures

In exchange for conducting an organizational climate assessment, the organization's leadership agreed to participate in research that resulted in the study presented here. An organizational representative was appointed as a project liaison, responsible for distributing the survey packets to departmental supervisors. During the two drill sessions, supervisors distributed survey packets to participants who completed the surveys at that time. Instructions to supervisors as well as survey in-

structions stated that participation was voluntary. To maintain confidentiality, participants returned the completed surveys and rating forms to the liaison. Researchers then matched inventories by name and department with a supervisor rating form for each individual.

Measures

The 111-item team member questionnaire included 8 multiple-choice demographic questions (gender, tenure, full-time or part-time status, rank, shop, unit, supervisor's name, and participant's name) and items in mixed order from scales on agreeableness, conscientiousness, and various scales not related to this study. Scale items used a five-choice format, with responses of 1 (*strongly disagree*), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), and 5 (*strongly agree*). Supervisors completed 10-item individual performance rating forms for each team member. Individual performance ratings were aggregated to yield a group performance score.

Agreeableness and conscientiousness. We adapted a 24-item Agreeableness scale from the NEO-Five-Factor Inventory Short Form (Costa & McCrae, 1992) by adding and revising items to refer to a military work environment. Example items include "I try to be courteous to everyone I meet at work" and "In my military work environment, I am a cheerful, high-spirited person." We used a similarly adapted 26-item Conscientiousness scale. Examples include "I strive for excellence in everything I do at work" and "I consistently do more than what is expected of me when at work."

Performance ratings. Development of the performance rating form included a focus group interview with a representative cross-section of the organization. During the interview, participants were asked to describe characteristics of superior-performing soldiers as well as those of soldiers needing improvement. After a brief discussion of common rating errors, participants completed performance-ranking forms to identify the most relevant performance dimensions for the organization. These rankings were then aggregated and analyzed for agreement among respondents, and 10 performance dimensions were derived. Each dimension included several behavioral descriptors to provide a common frame of reference for the raters (e.g., "*teamwork*: actively participates in team meetings, voluntarily assists others when his/her workload permits, and helps others who may not know as much as he/she does"). Supervisors rated individuals using a 20-point response scale with five gradations in each of four categories: adequate, above average, consistently above average, and superior. Subordinates were nested within supervisors. Subordinates received one performance rating in each category from their supervisor.

TABLE 1
Individual-Level Means, Standard Deviations, and Correlations

Variables	<i>M</i>	<i>SD</i>	α	1	2	3	4	5
1. Performance rating	15.09	3.71	.93					
2. Agreeableness	3.40	0.46	.80	.22**				
3. Conscientiousness	3.90	0.43	.83	.12**	.35**			
4. Military rank	5.44	1.58	—	.11*	-.05	.04		
5. Gender ^a	1.09	0.33	—	-.03	.05	-.02	.14**	
6. Status	1.87	0.43	—	-.07	-.12**	.02	.38**	.15**

Note. *N* = 422.

^a1 = male.

* $p < .05$. ** $p < .01$.

Variables

Individual-level variables for team members were computed by averaging each participant's responses to items in corresponding scales. Internal consistency reliability was assessed using Cronbach's coefficient alpha, which appears in Table 1.

Group-level variables from supervisor ratings were computed as averages across the rating scales by the team's supervisor. Group-level variables from the team member questionnaire were computed by aggregating team members' responses into averages or variances of three or more individual scores.

Group performance. The group performance score was computed as the unweighted average of individual team member performance ratings, after eliminating ratings by the few raters ($n = 8$) with no variance in their ratings. Coefficient alpha for performance ratings was .97, reflecting strong intercorrelations among all performance dimensions.

RESULTS

At the individual level of analysis, significant positive correlations were found between supervisor-rated performance and agreeableness ($r = .22, p < .01$) and conscientiousness ($r = .12, p < .01$). Table 1 lists individual-level descriptive statistics and intercorrelations.

Group-level correlations, shown in Table 2, yielded results partly in support of Hypothesis 1. The group performance measure correlated significantly with group average conscientiousness ($r = .34, p < .01$) and minimum group score ($r = .27, p < .05$) but not with group variance on conscientiousness ($r = .05, p > .05$). We ex-

TABLE 2
Group-Level Means, Standard Deviations, and Correlations

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Performance	15.18	2.34							
Agreeableness									
2. Mean	3.41	0.22	.28*						
3. Minimum	2.95	0.35	.37**	.82**					
4. Variance	0.17	0.13	-.34**	-.23	-.58**				
Conscientiousness									
5. Mean	3.91	0.17	.34**	.42**	.25**	.22			
6. Minimum	3.45	0.30	.27*	.26*	.32*	-.06	.60**		
7. Variance	0.19	0.18	.05	.07	-.06	.27*	.02	-.54**	
8. Agreeableness × Conscientiousness	13.37	1.24	.36**	.91**	.70**	-.07	.76**	.47**	.03

Note. *N* = 47 teams.

p* < .05. *p* < .01.

TABLE 3
Group Personality Composition Variables Predicting Group Performance

	<i>F</i>	β	<i>t</i>	<i>p</i>
Model 1	3.55			.04*
Agreeableness		.161	1.04	.30
Conscientiousness		.275	1.78	.08
Model 2	4.02			.01*
Agreeableness		-.7.64	-2.06	.05*
Conscientiousness		-4.80	-1.98	.05
Agreeableness × Conscientiousness		10.95	2.10	.04*

**p* < .05.

pected an inverse relationship between group performance and conscientiousness but did not find it.

Hypothesis 2 was fully supported. Group average agreeableness and group performance correlated positively ($r = .28, p < .05$). Group minimum scores correlated significantly with group performance ($r = .37, p < .01$), and group variance on agreeableness correlated inversely with group performance ($r = -.34, p < .05$).

Hypothesis 3 was also fully supported. As Table 3 indicates, the interaction term is significant ($p < .05$) in a model that includes the main effects. In addition, Figure 1 demonstrates that the interaction was in the proposed direction. That is, groups with higher levels of both agreeableness and conscientiousness performed better than all other types of groups.

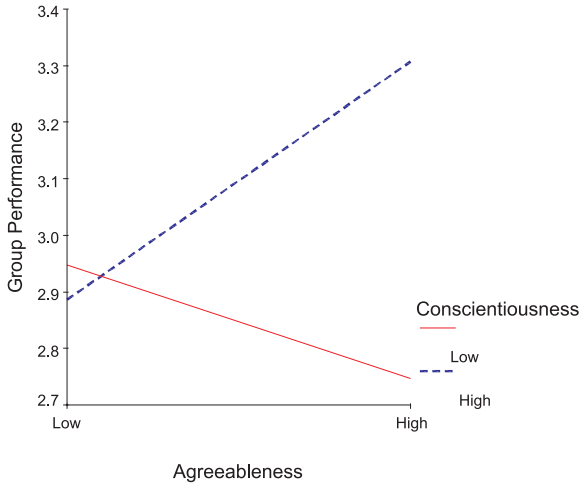


FIGURE 1 Mean group performance score as a function of group personality composition.

DISCUSSION

Results strongly supported the basic premise of the study: Personality composition of military service teams correlates with group performance, and complementary, group-level traits may even interact to promote group synergy. Group average and minimum scores on agreeableness and conscientiousness both correlated with supervisor-rated, group-level performance. Group performance was inversely related to group levels of variance for agreeableness but not for variance of conscientiousness. Groups high in both conscientiousness and agreeableness received better performance ratings than groups with all other compositions, suggesting a possible “synergy” of group personality composition on complementary traits.

Results at the individual level reinforced prior research that found individual conscientiousness and agreeableness correlated with individual performance (Hough, 1992). Group-level correlations exceeded corresponding individual correlations, which may suggest groups develop interpersonal dynamics around personality traits, such as group norms (Nielsen, Soulen, Halfhill, & Sundstrom, 2003). For instance, collective conscientiousness may have been associated with task-related norms, and collective agreeableness may have been related to relationship norms. Recent studies have presented both theoretical (Halfhill, Huff, Sundstrom, & Nielsen, 2003; Halfhill, Sundstrom, Lahner, Calderone, & Nielsen, 2005) and empirical (Halfhill, Sundstrom, & Nielsen, 2001) support of this relationship.

Group Personality Composition, Group Norms, and Group Effectiveness

Although speculative, given the surplus of recent studies relating group norms, group personality composition, and group effectiveness (Halfhill et al., 2003; Halfhill et al., 2005; Halfhill et al., 2001), we find it useful to frame our discussion with respect to group norms. Our finding that group average conscientiousness and agreeableness both correlated with group-level performance scores supports the idea that groups developed norms around their collective personality traits. If so, group norms may have reinforced individual inclinations through the well-documented dynamics around conformity and suppression of deviance in groups (e.g., Hackman, 1976). Group norms reflecting facets of conscientiousness may have aided group performance of key tasks through norms related to attention to detail, timeliness, organization, and other related behaviors. Similarly, norms around agreeableness may have helped groups provide excellent service through interpersonal sensitivity, responsiveness, and related behavior. Research has found evidence that group norms may help mediate the relationship of group personality composition and group performance (Barrick, Stewart, & Piotrowski, 2002). These studies and the findings presented here suggest that future research can profitably explore the role of group norms in the group-level correlates of group personality composition.

The correlation of group performance with minimum scores on conscientiousness and agreeableness points to a qualification on the possible dynamic of group norms around collective traits: Groups apparently went to their lowest common denominator, and set their norms around the member with the lowest score on the trait. Group minimum scores predicted performance approximately as well as group averages, so the lowest common denominator dynamic could be important. It resembles a dynamic suggested by Steiner's (1972) conjunctive group tasks, in that a collective trait may evolve into a norm consistent with a level of the trait that every member can easily manage. Conspicuously absent from our findings is any suggestion that group maximum scores drove the development of norms; apparently the most conscientious or agreeable member did not serve as a role model for a group norm.

The finding that group performance correlated inversely with variance on agreeableness further reinforces the idea of trait-based group norms. Apparently the groups that had greatest collective uniformity on agreeableness also had the best performance. In other words, individuals whose group composition made the development of group norms easiest and most natural were in the best-performing groups. In contrast, individuals whose group composition was most diverse on these traits, who would have had the greatest difficulty developing and enforcing norms, were in the worst-performing groups. Whether group

homogeneity aided the development of norms or whether homogeneous groups were more able or inclined to enforce their norms, or both, remain open questions for future research.

Our finding of unusually high performance among military service teams high on both conscientiousness and agreeableness points toward group synergy (Hackman, 1987) for complementary, collective personality traits. One possible explanation is that these groups may have been predisposed to develop norms related to both task and relationship in their service activities, and the combination may have pleased their supervisors and/or customers more than either set of norms alone. This speculation poses future research questions about the possible links among personality composition, group norms, and performance.

This study contributes to the literature on work teams in several ways. First, it adds to the research literature linking work team performance with personality composition (Barrick et al., 1998; Barry & Stewart, 1997). Our findings also reinforce earlier research showing individual-level relationships between personality traits and performance (e.g., Hough, 1992). Our results also point toward the possibility that complementary, collective traits may relate to synergy in work team performance, an idea that has long had appeal for group researchers (e.g., Hackman, 1987) but has only occasionally found support in empirical research (e.g., Tziner & Eden, 1985).

Several limitations associated with this study restrict the generality of the results. Data came from military service teams in just one location, consisting mostly of men. Our criterion measure—group-averaged supervisor ratings of individual performance—was a less than ideal substitute for a truly group-level criterion based on objective measurements.

The link between group personality composition and group performance raises at least three important questions for future research. First, do collective conscientiousness and collective agreeableness (and other traits) relate to group effectiveness in other kinds of groups? Second, how, if at all, does the relationship change when groups are more heterogeneous than those in our study? Third, and perhaps most interesting for purposes of both theory and application, what interpersonal dynamics underlie the relationship of personality composition and group performance? If, for example, the key mediating variable is group norms, the practical and theoretical implications would be substantial (Hackman, 1976).

In conclusion, this field study of 47 military service teams found group personality composition correlated with group performance. Group average agreeableness and conscientiousness both correlated with supervisor-rated group-level performance. Groups high on both average conscientiousness and average agreeableness scores received significantly higher performance ratings than groups with all other compositions, suggesting a possible synergy of group personality composition on complementary traits.

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