Group Cohesion DEOCS 4.1
Construct Validity Summary

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DEOMI PRESS

Technical Report #12-18

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Background

In 2014, DEOMI released DEOCS 4.0 for Department of Defense military and civilian members. DEOMI initiated development of DEOCS 4.1 in May 2016. This effort includes various updates to improve climate factors and individual items on the DEOCS. The following paper details the work conducted to modify the factor of Organizational Cohesion. Included is a review of the 4.0 description and items, followed by the proposed modifications to the factor.

The current description of Organizational Cohesion is the "perception of solidarity in the face of challenges or threats to the organization's mission success" ("Assessment to Solutions," 2016). The factor presently includes four items, presented below in Table 1.

Table 1.
DEOCS 4.0 items for Organizational Cohesion

1.	Members look out for each other's welfare.
2.	Members support each other to get the job done.
3.	Members work well together as a team.
4.	Members trust each other.

The process followed to modify this factor involved a literature review of organizational cohesion, exploring construct definitions and validated measures. Based on the literature review below, it was determined that a better term for the construct of interest for DEOCS 4.1 is Group Cohesion.

Literature Review

Group cohesion is defined by Carron, Brawley, and Widmeyer (1998) as "a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs" (as cited in Ahronson & Cameron, 2007, p. 12). The factor title was changed from "organizational cohesion" to "group cohesion" to more accurately reflect the underlying structure of military and civilian individuals, either on deployment or in the workplace. For instance, Oliver, Harman, Hoover, Hayes, and Pandhi (1999) meta-analytically reviewed the concept of military unit cohesion. They noted the importance of cohesion within groups, examining commonly reported groupings such as squadrons, sections, and platoons, finding positive relationships between group cohesion and both job satisfaction and performance. This influence of group cohesion is also seen in the work environment. For example, Wech, Mossholder, Steel, and Bennett (1998) examined Air Force and civilian employee work groups, and found work group cohesion was positively related to both performance and organizational commitment.

Items based on the definition of group cohesion were adapted from the Group Environment Questionnaire (GEQ; Carron, Widmeyer, & Brawley, 1985), and are included in Table 2 below. This measure has been tested in a military setting, with cohesion found to be positively related to job satisfaction and job performance, and negatively related to psychological distress (Ahronson & Cameron, 2007).

Table 2.
Adapted GEQ items (Carron et al., 1985)

1. The group is united in trying to reach its goals for performance.
2. We all take responsibility for the performance of our group.
3. If members of our team have problems at work, everyone wants to help them so we can get back on task.
4. Members of our team do not communicate freely about each other's responsibilities throughout a project.

Data Analysis

Sample

This section shows the demographic characteristics of respondents to two separate administrations used to test the new group cohesion items (Table 3). Items were tested using a four-point scale (n = 9,035), conducted February 19 – 26, 2016, and a seven-point scale (n = 5,111), conducted July 14 – 19, 2016. These new items were tested on individuals immediately after they completed the DEOCS. Statistics for each group are presented in the tables below. The demographic data reflect individual respondents' selections (except for branch of service, which is reported by the organization's survey administrator).

Table 3.
Sample Demographics of Organizational Cohesion Items Piloted on DEOCS

	Four-point Scale		**Seven-point Scale**	
	n	%	*n*	%
Branch of Service				
Army	3,996	46.6%	2,035	38.8%
Navy	1,496	17.4%	1,457	27.8%
Marine Corps	385	4.5%	925	17.6%
Air Force	1,152	13.4%	130	2.5%
Coast Guard	229	2.7%	5	<1%
National Guard	1,325	15.4%	559	10.7%
Component				
Active Duty	4,451	77%	3,409	87.6%
Reserve	1,360	23%	484	12.4%
Gender				
Male	7,093	79%	4,100	78.2%
Female	1,936	21%	1,143	21.8%
Seniority				
Junior Enlisted (E1 – E3)	1,316	19%	1,047	23.5%
Non-Commissioned Officer (E4 – E6)	3,994	56%	2,363	53.0%
Senior Non-Commissioned Officer (E7 – E9)	757	11%	463	10.4%
Junior Officer (O1 – O3)	662	9%	362	8.1%
Senior Officer (O4 and above)	369	5%	225	5.0%

Descriptive Statistics and Reliability

This section displays descriptive statistics for the items on both the four- and seven-point scales. The four- and seven-point scales both ranged from *strongly disagree* to *strongly agree*,

with the seven-point scale including three extra anchors, *slightly disagree, neither agree nor disagree, and slightly agree.* All reliability analyses were conducted using Cronbach's Alpha. The respective reliability coefficients for both scales were adequate (i.e., .77and 92). See Table 4 for more information regarding item reliabilities.

The relationship between the original four-point scale (Organizational Cohesion) and the new four-point scale (Group Cohesion) was also examined, revealing a significant, positive relationship ($r = .67$, $p < .01$) between the measures. After testing the items using the four-point scale, one item was found to be reducing Cronbach's Alpha, and was subsequently dropped from all future analyses, including those using the seven-point scale. Tables 4 and 5 provide additional information regarding the reliability and descriptive statistics of the GEQ items.

Table 4.
Cronbach's Alpha if item deleted

	Scale *M* if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Four-point Scale Items				
The group is united in trying to reach its goals for performance.	8.35	3.78	.72	.63
We all take responsibility for the performance of our group.	8.38	3.75	.73	.63
If members of our team have problems at work, everyone wants to help them so we can get back on task.	8.38	3.83	.70	.65
Members of our team do not communicate freely about each other's responsibilities throughout a project.	8.64	5.21	.22	.89
Seven-point Scale Items				
The work group is united in trying to reach its goals for performance.	10.61	10.40	.84	.88
We all take responsibility for the performance of our work group.	10.68	10.09	.85	.87
If members of our team have problems at work, everyone wants to help them so we can get back on task.	10.79	10.20	.82	.90

Table 5.
Item statistics for Group Cohesion

Item	*M*	*SD*	Skewness	Kurtosis
Four-point Scale Items				
The group is united in trying to reach its goals for performance.	2.90	.84	-.60	-.06
We all take responsibility for the performance of our group.	2.87	.85	-.54	-.16
If members of our team have problems at work, everyone wants to help them so we can get back on task.	2.86	.84	-.57	-.11
Members of our team do not communicate freely about each other's responsibilities throughout a project.	2.61	.87	-.15	-.65
Seven-point Scale Items				
The workgroup is united in trying to reach its goals for performance.	5.43	1.65	-1.21	.66
We all take responsibility for the performance of our workgroup.	5.36	1.70	-1.14	.41
If members of our team have problems at work, everyone wants to help them so we can get back on task.	5.25	1.71	-1.03	.15

Principal Components Analysis

After removing one item from the modified GEQ scale (i.e., "Members of our team do not communicate freely about each other's responsibilities throughout a project") to make the scale more parsimonious, factor analysis was conducted on the remaining three items.

Two measures to test fit between the data and the factor analysis were utilized. The Bartlett Test of Sphericity (BTS; Snedecor & Cochran, 1983) examines the hypothesis that the correlation matrix is an identity matrix. The obtained value of this test statistic for sphericity was large, and the associated significance level was small (BTS = 11,687.79; $p < .01$). This allows us to reject the null hypothesis that the correlation matrix is an identity, and to conclude that the factor analysis is an appropriate method to analyze these data (Norusis, 1993). The Kaiser Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser & Rice, 1974) was also used to compare the sum of the squared correlation coefficients and the squared partial correlation coefficients. The obtained statistic was .76, indicating a very good fit, and suggests that a factor analysis is an appropriate statistical method to analyze these data.

The principal components analysis yielded a single factor solution. These results suggest that the theoretical definition of Group Cohesion as a single construct is supported. Refer to Table 6 for more information.

Table 6.
Principal Component Analysis Pattern Matrix of Group Cohesion Items

Items	Component 1
The workgroup is united in trying to reach its goals for performance.	.93
We all take responsibility for the performance of our workgroup.	.94
If members of our team have problems at work, everyone wants to help them so we can get back on task.	.92

Note. All items loaded on to one factor.

ICC

This section contains the demographic characteristics of the sample of individuals used for the aggregation statistics. These individuals come from units containing 16 or more individuals each (n = 1,789). The demographic information reflects what survey respondents provided, while Service branch membership reflects the survey administrators' selections. The Service branch representation of this sample includes: 28.3% Army (n = 506, 26.1% Navy (n = 467), 33.9% Marine Corps (n = 606), and 10.2% National Guard (n = 183). The majority of respondents within this sample are male (n = 1,387; 77.5%).

Averaged $r_{wg(j)}$ results indicate marginal average within-group agreement for the group cohesion climate ($\bar{r}_{wg(j)}$ = .42). However, these results should be interpreted with caution because the $\bar{r}_{wg(j)}$ coefficient was used on the sample as a whole, rather than for each group separately. Additionally, while .70 is viewed as the rule-of-thumb cut-off, the .42 coefficient obtained in this instance may be acceptable, as the .70 value is viewed as an arbitrary cut-off point (Harvey & Hollander, 2004). One limitation of the rwg(j) index is that if the null distribution does not reflect random responses, the index loses strength of interpretability. Because of this limitation, we examined additional interrater agreement indices, including AD_M, *ICC(1*), and *ICC*(*K*) (Agle et al., 2006). Regarding the mean AD_M for each item, scores were close to the critical value of 1.2 for a seven-point scale (Burke & Dunlap, 2002). Additionally, the average of the AD_M indices suggests high within-group agreement ($AD_{M\,(J)=}$ 1.27).

Intraclass correlations were calculated to determine the amount of variance that can be explained by the unit (LeBreton & Senter, 2008). In other words, *ICC(1)* explains the total variance that can be explained by group membership. Thus, an *ICC(1)* of .10 can be interpreted as 10% of the variability in individual's responses can be explained by group membership (Bliese, 2000). ICC(1) can be interpreted similarly to effect size, with a value of .01 considered a "small" effect, a value of .10 considered a "medium" effect and a value of .25 considered a "large" effect (LeBreton & Senter, 2008).

A small-to-medium effect was found for Group Cohesion, suggesting that 5% of an individual's responses can be attributed to unit membership. ICC(2) is an estimate of the reliability of the group means (Bliese, 2000). Thus, an ICC (2) indicates whether groups can be reliably differentiated based on the group mean. Although there are no strictly-defined standards

of acceptability for ICC(2) values, our obtained ICC(2) OF .60 marginally meets Glick's (1985) recommended cutoff of .60.

The discriminant power of the group cohesion scale was assessed using one-way Analysis of Variance (ANOVA) procedures. Hays (1981) suggests that an F ratio > 1.00 provides the minimal evidence for differences across groups. The F ratio for Group Cohesion obtained from our sample met this criterion (F (60, 1788) = 2.47, $p < .01$).

Thus, taken together, the pattern of the interrater agreement indices and the results of the one-way ANOVA provide initial support for aggregating these data to the unit level. Aggregation statistics will be further explored after collecting data from a sufficient number of complete units.

Conclusion

The results from the above analyses suggest that the group cohesion items adapted from the GEQ (1985) are considered to be a reliable scale that measures a single factor that can be aggregated to the unit level. The final three Group Cohesion items are provided in Table 7. Future analyses will be conducted following administration of DEOCS 4.1 to establish convergent and discriminant validity.

Table 7.
DEOCS 4.1 items for Group Cohesion

1.	The workgroup is united in trying to reach its goals for performance.
2.	We all take responsibility for the performance of our workgroup.
3.	If members of our team have problems at work, everyone wants to help them so we can get back on task.

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