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U.S. Army Research Institute
for the Behavioral and Social Sciences

Research Report 1609

Relationships Between Vertical Cohesion and Performance in Light Infantry Squads, Platoons, and Companies at the Joint Readiness Training Center (JRTC)

Cathie E. Alderks
U.S. Army Research Institute

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This paper presents the scales developed to determine weakness in vertical cohesion (cohesion between leaders and subordinates) between soldiers from squad members through company commanders. The weaknesses were termed "breaks." After a pattern of breaks was determined, the pattern was related to simulated combat performance at a U.S. Army Combat Training Center. No or few breaks in the platoon vertical-cohesion chain from squad member to company commander were associated with better platoon performance. Breaks in vertical cohesion with the top platoon leader (platoon sergeant and platoon leader) were associated with below-average platoon performance. A break at the squad leader level affected how the soldiers rated their proficiency prior to a rotation at the Combat Training Center but did not have significant bearing on platoon performance.

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Research Report 1609

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FOREWORD

A primary mission of the Leadership, Personnel, and Organizational Change Technical Area of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to enhance small unit readiness and performance through research to improve leadership, cohesion, and motivation. The research described in this report is part of a larger project focusing on how factors at a unit's home station affect subsequent unit performance at the U.S. Army Joint Readiness Training Center (JRTC). This research project, entitled "Determinants of Small Unit Performance," is part of a wider program of research carried out by several ARI technical areas and field units on the determinants of JRTC unit performance.

This report describes the pattern of vertical cohesion (cohesion between subordinates and leaders) in a set of light infantry platoons. Its purpose is to demonstrate the importance of strong vertical cohesion chains in small units. The results will be used to develop information and programs for unit leaders and for individual leader development. An initial analysis of the results was briefed to representatives of the Center for Army Leadership and the Combined Arms Center--Training in December 1990 at Forth Leavenworth, Kansas.

The sponsor for the research presented in this report--the Center for Army Leadership, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas--has reviewed this report and supports its publication. Research is being conducted under a Memorandum of Agreement between the U.S. Army Command and General Staff College and ARI dated 15 November 1990, subject: "Program of Research in Support of the Center for Army Leadership." The research presented in the report was initiated under an earlier (1987) Memorandum of Agreement between the same parties.

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Technical Director

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RELATIONSHIPS BETWEEN VERTICAL COHESION AND PERFORMANCE IN LIGHT INFANTRY SQUADS, PLATOONS, AND COMPANIES AT THE JOINT READINESS TRAINING CENTER (JRTC)

EXECUTIVE SUMMARY

Requirement:

When combat infantry platoons are nearly or fully trained and equally equipped, the differences among them in performance are due in part to such intangibles as motivation and cohesion. While the relationship between cohesion and efficient teamwork among platoon members has been well documented, little research has looked at cohesion across the different ranks and grades within the platoon. The requirement for this research was to determine how vertical cohesion (cohesion between leaders and subordinates) from squad members through company commanders affects the performance of light infantry brigades.

Procedure:

Data used in this report were collected by questionnaires from soldiers (squad members, squad leaders, platoon sergeants, and platoon leaders) in 24 line and specialty platoons within two light infantry battalions. The questionnaires were administered at three different times: (1) baseline: 3 to 4 months before a training rotation to the Joint Readiness Training Center (JRTC); (2) pre-rotation: approximately 2 weeks before the rotation; and (3) post-rotation: approximately 2 weeks after the rotation. In addition, platoon performance data were collected by observer/controllers (OCs) at the JRTC.

On baseline and pre-rotation questionnaires, soldiers were asked to rate their leaders on behaviors or attitudes that contribute to the affective (or caring) dimension of vertical cohesion. Topics within this dimension included the leader's proficiency in treating the subordinate fairly, in looking out for the subordinate's welfare, in being friendly and approachable, and in pulling his share of the load in the field. In addition, soldiers were asked to rate their platoon's proficiency in performing combat missions. On post-rotation questionnaires, soldiers were asked to rate platoon performance at the JRTC.

Data were analyzed by locating weaknesses or "breaks" in cohesion with leaders. The results were then related to performance.

Findings:

No or few "breaks" within the platoon vertical-cohesion chain from squad member to company commander were associated with better platoon performance. Breaks in vertical cohesion with the top platoon leader (platoon sergeant and platoon leader) were associated with below-average platoon performance. A break at the squad leader level, while affecting how the soldiers rated their proficiency before the rotation, did not have significant bearing on their actual JRTC platoon performance.

Utilization of Findings:

Recommendations will be incorporated into pilot programs for unit leaders to enhance the training and readiness of their units. They also will be utilized, as needed, by the Center for Army Leadership (CAL), Fort Leavenworth, Kansas, in the design of training and training materials for leaders and for leadership development.

RELATIONSHIPS BETWEEN VERTICAL COHESION AND PERFORMANCE IN LIGHT INFANTRY SQUADS, PLATOONS, AND COMPANIES AT THE JOINT READINESS TRAINING CENTER (JRTC)

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RELATIONSHIPS BETWEEN VERTICAL COHESION AND PERFORMANCE IN LIGHT INFANTRY SQUADS, PLATOONS, AND COMPANIES AT THE JOINT READINESS TRAINING CENTER (JRTC)

Introduction

As stated in the U. S. Army, FM 22-100, page 42:

> "Cohesion represents the commitment of soldiers of all ranks to each other and strengthens their willingness to fight and sacrifice personal safety. It is a product of the bonding of soldiers with each other and the bonding of leaders and subordinates. Cohesion requires strong bonds of mutual respect, trust, confidence, and understanding within units."

Throughout history, cohesion among troops has been a key factor in successful battle performance. Where cohesion was strong, performance was better, casualties were fewer, and heroic actions were more numerous. Especially important is the cohesion between leaders and subordinates--vertical cohesion. As stated by one young soldier, "About officers--everybody wants somebody to look up to when he's scared. It makes a lot of difference" (Stouffer, et al., 1949, p. 124).

In an early discussion of cohesion, Shils and Janowitz (1948) implied two dimensions of vertical cohesion: 1) the affective or caring dimension and 2) the instrumental or technical-competence dimension. Further substantiation of the dimensions is reported by Griffith (1988). The building of both dimensions are crucial in the attainment of mutual respect, trust, confidence, and understanding within the unit.

In order for vertical cohesion to be available for the battlefield, it must be established prior to battle. The confidence and trust between leader and subordinate develops over time. It is so important that one of the primary peacetime responsibilities of a leader is to create "trust and strong bonds" with his soldiers, the same trust and strong bonds that will sustain both the leader and his soldiers in battle (FM 22-100, p. 62).

The majority of research on vertical cohesion refers to either leaders in general or to only the immediate commander. Little work examines vertical cohesion through the echelons of leadership. The present research was designed to investigate the effects of possible disconnects or "breaks" within the vertical cohesion chain on performance as demonstrated at the Joint Readiness Training Center (JRTC). (The JRTC has been considered to be as close as one can get to combat without engaging in actual conflict.) Soldiers from squad members through platoon leaders made up the vertical cohesion chains.

The results were expected to determine if a "break" at one level might be more crucial to platoon performance than at other levels or if numerous "breaks" along the chain would have a greater detrimental effect than fewer "breaks."

Method

Sample

Soldiers from 24 platoons (18 line and 6 specialty platoons) from 2 light infantry battalions provided data. The data were obtained by ARI researchers at three points in time: 1) baseline - three to four months prior to a rotation at the JRTC; 2) pre-rotation - approximately two weeks prior to the rotation at the JRTC; and 3) post-rotation - within two weeks following the rotation at the JRTC. All data at baseline and pre-rotation were collected by questionnaire; data at post-rotation were collected by questionnaire and interviews. In addition, platoon performance data were provided by observer/controllers (OCs). A more in-depth description of the sample may be found in Tremble and Alderks (1992).

Questionnaire Administration

Baseline and pre-rotation questionnaires were administered to soldiers (squad members (SMs), squad leaders (SLs), platoon sergeants (PSs), and platoon leaders (PLs) one company at a time in a dayroom or classroom setting. Soldiers responded to the questionnaire on a machine-scorable answer sheet. The questionnaires consisted of approximately 160 items and took the soldiers less than one hour to complete. Post-rotation questionnaires (which took place in a dayroom or office setting) consisted of 21 questions (plus unit and position identification items) and took less than 10 minutes to complete prior to the commencement of small group interviews. Company Commanders (CCs) also rated the performance of the platoons under their command at "post-rotation." Further details about the questionnaires or administration may be found in Tremble and Alderks (1992).

Scale Development

Nine items from the questionnaires (both at baseline and pre-rotation) that incorporated the affective aspects of vertical bonding comprised the scales used to assess the strength of vertical cohesion.[1] These scales are listed in

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[1] As the majority of soldiers in the sample lacked actual combat experience and therefore, might not know the instrumental capabilities of all their leaders, only the

Table 1

Scales Used to Assess the Strength of Vertical Cohesion Among the Echelons of Soldiers

Scale	Description of Scale
SM-SL	Squad Member rating the Squad Leader
SM-PS	Squad Member rating the Platoon Sergeant
SL-PS	Squad Leader rating the Platoon Sergeant
SM-PL	Squad Member rating the Platoon Leader
SL-PL	Squad Leader rating the Platoon Leader
PS-PL	Platoon Sergeant rating the Platoon Leader
PS-CC	Platoon Sergeant rating the Company Commander
PL-CC	Platoon Leader rating the Company Commander

Table 1 with the types of items making up the scales listed in Table 2.[2] In each of these items, a subordinate rated his leader(s) on a 5-point numerical scale with "1" being low and referring to "almost never" and "5" being high and referring to "almost always". Psychometric properties, internal characteristics, correlations, and confirmatory factor analyses were utilized to substantiate the scales. The results of these analyses are found in Appendices B, C, D, and E, respectively.

Performance Scales

Platoon performance scores were based on ratings made by OCs of missions performed at the JRTC. These ratings were made immediately following the unit's rotation. In addition, individual soldiers of all ranks and grades from the SM through the CC also rated their JRTC performance; these ratings occurred within two weeks following the unit's rotation. Types of missions rated included, among others, movement-to-contact, defense, and deliberate attack. Further details of these scales may be found in Tremble and Alderks (1992). Those

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affective dimension was assessed.

[2] A complete list of the items including the questionnaire item number for each scale are listed in Appendix A. Due to questionnaire space limitations, several items were omitted for scales SM-SL, SM-PL, and PS-PL. Therefore, these scales were composed of fewer than nine items.

ratings which correlated best with the OC ratings that were obtained are the ratings by the CC ($r(20) = .50$, $p < .05$) and PS ($r(16) = .75$, $p < .001$). Groups of raters who demonstrated good correlations with the OCs include the average of PL, PS, SL, and SM (LSQM), $r(21) = .41$, $p < .05$; the CC averaged with LSQM (CPLT), $r(23) = .50$, $p < .01$; and the CC, PL, PS, SL, and SM averaged together with all levels receiving a weight of 1 (CLSQM), $r(23) = .42$, $p < .05$. Additional details may be found in Appendix F.

Table 2

Items Used in Vertical Cohesion Scales

Item
(Leader) recognized subordinates' accomplishments.
(Leader) ensures that subordinates understand his instructions.
(Leader) listens effectively/actively to subordinates.
(Leader) delegates decision making to subordinates.
(Leader) treats us fairly.
(Leader) looks out for the welfare of his people.
(Leader) is friendly and approachable.
(Leader) pulls his share of the load in the field.
(Leader) would have my confidence if we were in combat together.

Self-ratings of platoon proficiency on combat missions were collected at both baseline and pre-rotation administrations of the questionnaires by SMs, SLs, PSs, and PLs. The combat missions assessed included movement-to-contact, defense, and deliberate attack. An overall proficiency score was constructed from the mean of the three rated tasks. These scores will be referred to as "expected-performance" as they were collected prior to actual JRTC performance and are an indication of how proficient the soldiers believed they were. These expected-performance means were correlated with the OC and other post-performance scores.

As the main emphasis of the present paper relates to how vertical cohesion impacts performance rather than performance per se, a brief synopsis of the performance results follows and

the details are found in Appendix F. The baseline (approximately four months prior to the rotation) SM's- and PS's-expected-performance ratings correlated with the OC's ratings of performance as well as the majority of other levels and groups of soldier. Correlations, however, were not significant with SL's ratings of performance. SM's and PS's offensive ratings (movement-to-contact and deliberate attack) also correlated with the OC ratings. SM's defensive ratings (defend) correlated with OC and other leader ratings of performance.

However, at pre-rotation, the pattern shifted. OC and CC ratings generally did not correlate with the expected-performance ratings. SM's ratings correlated primarily with PL and SM raters of performance. SL's ratings correlated only slightly with PLs, PSs and several of the groups of raters. PS offensive (movement-to-contact and deliberate attack) ratings correlated with their SMs' expected-performance. PL pre-rotation expected-performance ratings were essentially not correlated with any of the actual-JRTC-performance ratings.

Vertical Cohesion in the Chain of Command

Disconnects or weaknesses in vertical cohesion were examined by locating "breaks" in the cohesion chain and by investigating the effects of these "breaks" on performance. Conceptually, a break in vertical cohesion was considered to be a point where confidence in the leader was lost or where there was feeling that the leader did not take care of his troops such that bonding to the leader was lost or diminished. Operationally, a break in vertical cohesion was determined in the following manner. First, all scores for the vertical cohesion scales were converted to z-scores (standardized scores)[3]. Second, mean scores for leaders were determined by averaging subordinates ratings of them, (e.g., a PL score was determined by averaging the SM-PL, SL-PL, and PS-PL scale scores). Third, a platoon was said to contain a break at a

[3] A z-score is produced with a transformation of the data that places all data points on the same mathematical scale. It shows the relative status or location of a particular score within the distribution. The average z-score is always zero. Therefore, a score greater than zero is above average and a score less than zero is below average. The magnitude of the score, either positive or negative, indicates distance from the average. Approximately 68% of the scores lie within $z = \pm 1.00$.

certain level if the z-score/mean z-score for that level was z $\leq -.50$.[4]

Averaged scores for leaders were used because researchers have shown that inter-rater agreement between subordinate raters tends to be low (French and Bell, 1978; Latham and Wexley, 1981; Miner, 1968; Mount, 1984). Averaging of scores has the effect of reducing error bias to obtain greater reliability. In addition, there is some indication that averaged subordinate ratings correlate more positively with observer ratings than individual ratings (Ilgen and Fujii, 1976).[5]

The data were examined in several ways with the break as the basis. First, performance with respect to <u>breaks at each level</u> was examined. Second, performance was examined as determined by where the <u>lowest break</u> in a platoon occurred; the presence or absence of additional breaks was not considered. For example, if the first break occurred at the PS level, other breaks at either the PL or CC levels were not considered in the analysis. Third, performance with respect to the <u>number of breaks</u> in the chain was examined regardless of where the breaks occurred. Frequency distributions showing numbers of platoons for each of these methods are found in Appendix G.

Results

Individual Breaks

Since one level of leader may be more crucial to the performance of the platoon, each level of leader was examined separately. First, correlations between performance (both

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[4] A z-score of -.50 roughly corresponds to the thirtieth (30th) percentile. Thus, approximately ⅓ of the platoons obtained a z-score of -.50 or below. In addition, this score corresponds to a questionnaire response of "sometimes" (as opposed to "almost always" or "usually" for soldiers who rated their leaders into the higher percentiles) for the majority of levels of soldier.

[5] While averaging scores has the effect of reducing error bias, it was perhaps not essential in the present research. In a preliminary analysis of the data, breaks were determined such that only one group of rating soldier within the platoon needed to exhibit a score of $z \leq -.50$. For example, three levels of soldier (SM, SL, and PS) rated the PL. If <u>any</u> of those levels rated the PL with a $z \leq -.50$, a break was said to be present. It was not necessary that the average of all groups be $z \leq -.50$. The results were essentially the same as in the present paper (Alderks, 1990).

expected- and actual-) and soldier break groups were computed. Correlations with breaks determined from pre-rotation scores were generally higher than for those computed from baseline scores. Appendix H provides tables showing the results of the analysis.

Correlations between expected-performance and presence of breaks were borderline significant at the SL level as rated by SMs. In addition, offensive performance and a break at the PS level produced high correlations for SM and PS raters. A break at the PL level correlated only with SM expected-movement-to-contact and SL expected-deliberate-attack performance. A break at the CC level and performance produced a high correlation for PL raters only at baseline.

Correlations between the presence of breaks and actual-performance revealed a different pattern. Breaks at the PS and PL levels correlated significantly with JRTC performance measures by PSs and PLs. With the exception of a single significant correlation at baseline between the OC ratings of performance at an SL break, there were no correlations between a break at the SL level and platoon performance. A break at the CC level was not correlated with actual-performance scores at pre-rotation.

Results of t-tests for expected-performance and actual-performance of platoons as grouped by the presence or absence of a break at each level confirm the implications of the correlations. These results are found in Appendix I.

Lowest Break

The second method for examining the data was to determine the effects on performance of the lowest break within each cohesion chain. The rationale was that the lower leaders oversee the squad members who accomplish the direct fighting tasks. Therefore, lower breaks in the chain might play a greater role in platoon performance than breaks that occurred higher. However, as the individual-break analyses indicated that SLs seem to have little bearing on platoon performance and as the inclusion of an SL break might obscure findings at other levels, analyses involving the lowest-break method were performed twice. First, the data were analyzed with the possibility of a break at the SL level. Second, the data were analyzed in an identical manner but without the possibility of a break at the SL level, i.e., if a break had originally occurred at the SL level, that break was ignored; the next lowest break was considered as the lowest break. Results of the analyses can be found in Appendices J and K.

When SL breaks were included in the analysis, correlations between SM offensive expected-performance and the lowest break

were significant. For SMs and PLs at pre-rotation, ratings of expected-performance of deliberate attack were positively correlated with the position of the lowest break; other correlations were either not significant or seemingly random.

Correlations between actual-performance and where the lowest break occurred were statistically significant at baseline only for OCs and PLs. At breaks as determined at pre-rotation, only PLs' ratings correlated significantly with the presence or absence of a lowest break at the SL level.

When SL breaks were omitted from the analysis, at pre-rotation, only SMs' expected-movement-to-contact and SLs' expected-deliberate-attack were correlated with the location of the lowest break.

However, for actual-performance measures, breaks at the lower levels were associated with poorer platoon performance while breaks at higher levels or no breaks were associated with better platoon performance for ratings by PSs and PLs.

Mean expected- and actual-performance ratings reinforce the correlations (see Appendix K). While not all groups of raters exhibited significant differences between the means of performance scores, the pattern of ratings among raters is similar. In short, poorer performance is associated with "lowest breaks" at either the PS or PL levels; better performance is associated with either no breaks or breaks above the platoon level. Breaks at the SL level seem less important to good platoon performance than breaks at a platoon leadership level.

Figures 1 and 2 demonstrate graphically actual-performance means as determined by the OCs and by the average of all self raters (CC, PL, PS, SL, SM) as separated by low-break group at pre-rotation. Figure 1 means were constructed with a break at the SL level being a possibility. Figure 2 means were constructed with a break at the SL level not being a possibility, (i.e., any platoon that demonstrated an SL break was reassigned to the next higher group where it exhibited a break).

A stepwise regression analysis also indicated that the best predictors of performance were the presence or absence of breaks located at the platoon leadership (Platoon Sergeant and Platoon Leader). (See Appendix L for Beta values, R^2 values, F values, and predictor for each rater group.)

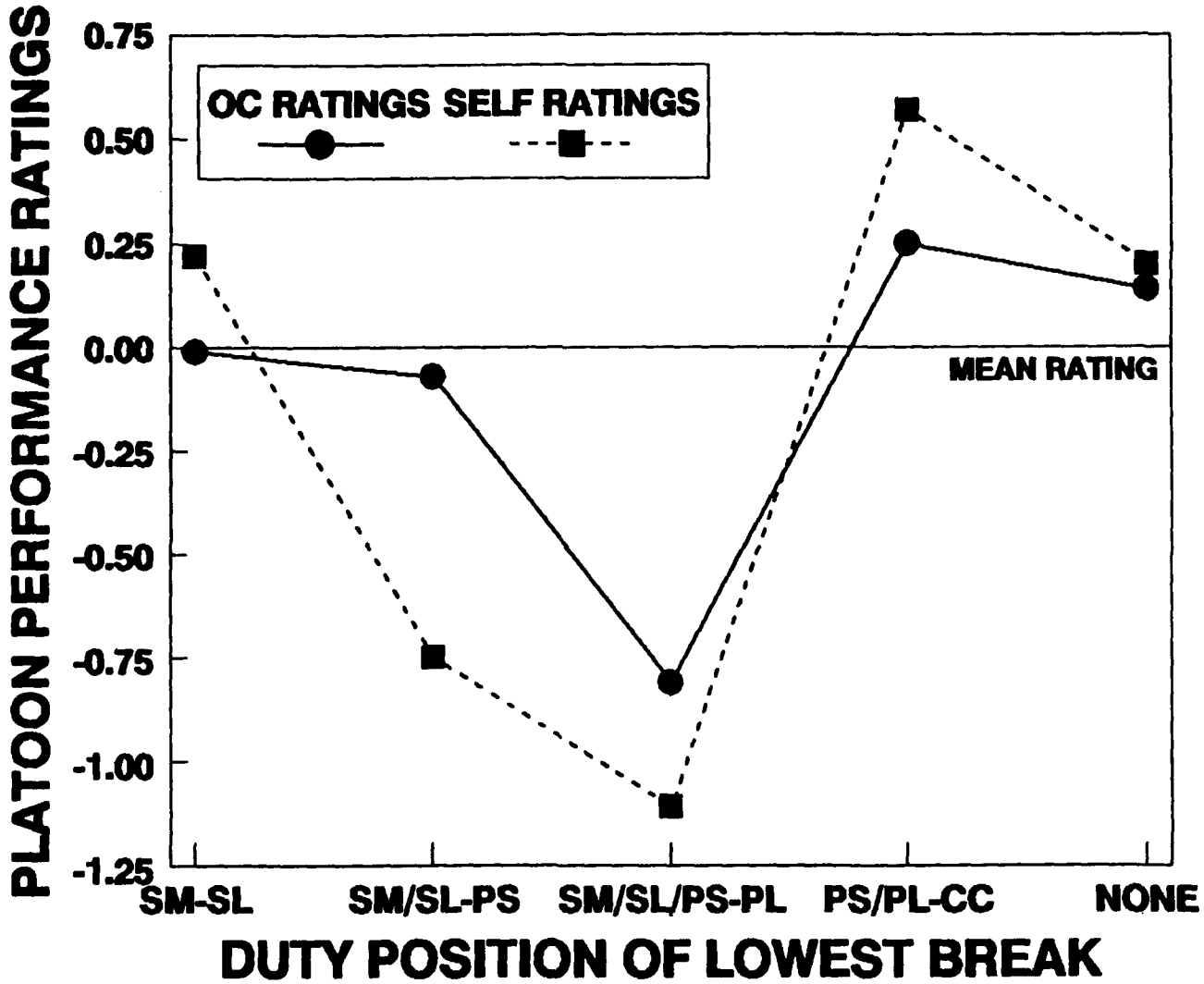

Figure 1. Lowest Break in Vertical Cohesion by Platoon Performance Ratings

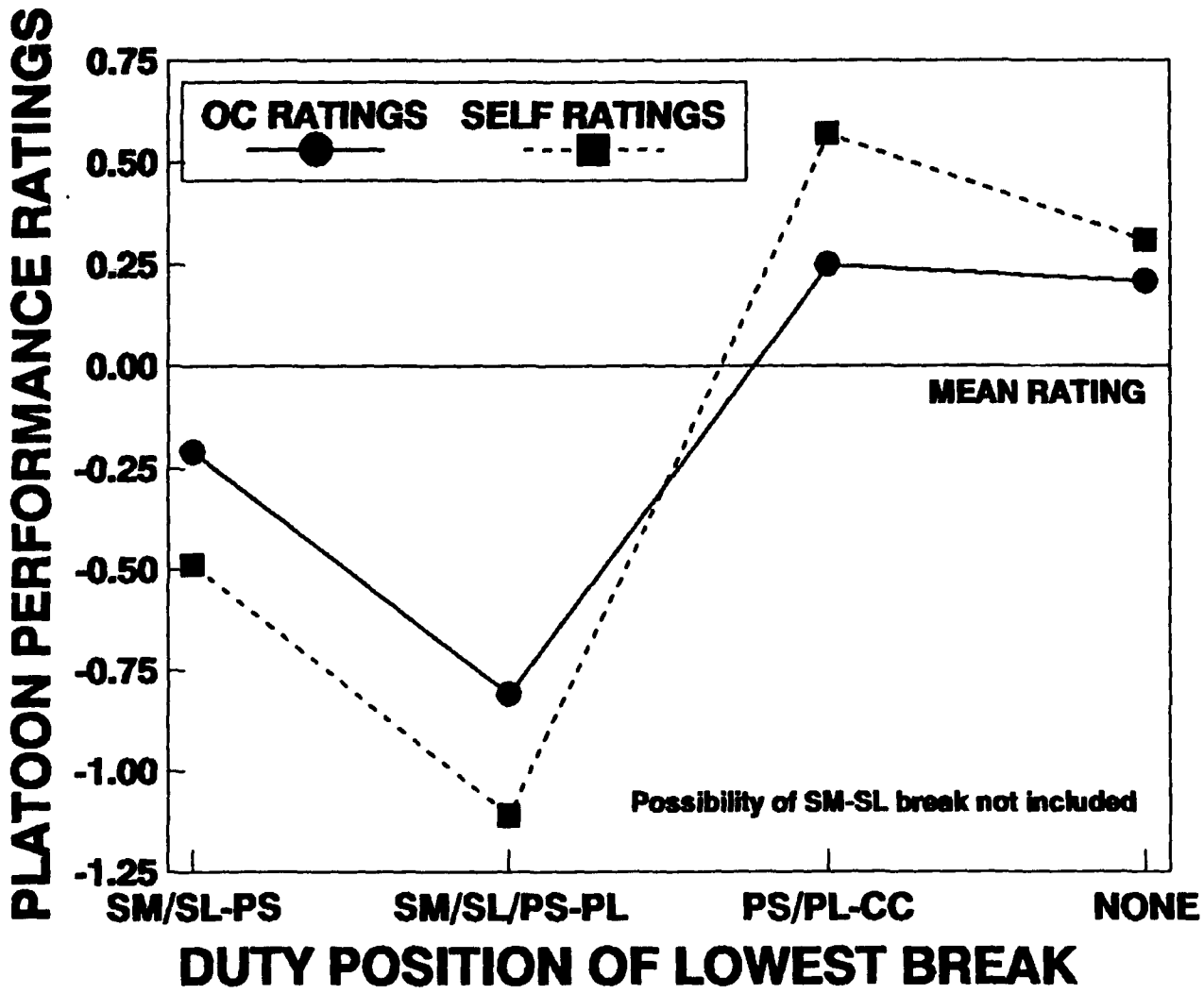

Figure 2. Lowest Break in Vertical Cohesion by Platoon Performance Ratings

Number of Breaks

The third method of analyzing the results was to look at the total number of breaks that occurred within a leadership chain regardless of the position of those breaks.[6] Again, detailed results of the analysis are found in Appendices J and K.

Regardless of whether or not the SL was included in the analysis, SM ratings indicated that as there were more breaks within the leadership chain, performance was poorer. Of interest, however, is that SMs were more negative in their appraisal at baseline than at pre-rotation. Perhaps with training, SMs were more confident with their skills than they had been at the outset.

PSs gave lower ratings as training continued from baseline to pre-rotation. At baseline, there was no correlation between expected-performance and the number of breaks. However, at pre-rotation, the correlations between low expected-movement-to-contact performance and number of breaks was high.

Actual-performance followed the pattern of expected-performance. As the number of breaks increased, performance decreased. While the correlations between the number of breaks and performance ratings by the OCs and CCs were not significant, the direction of correlation was in line with the other raters.

Figures 3 and 4 present graphically means of performance by the number of breaks found within each leadership chain. Figure 3 presents the data where the possibility of an SL break was considered in the analysis; Figure 4 presents the data where the possibility of an SL break was not considered in the analysis.

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[6] Understandably, there is a high correlation between "number of breaks" and "lowest break" (a platoon with a high number of breaks within the cohesion chain would also have a lowest break at a low level). Under these conditions, results for one break variable could have represented the influence of the other. This possibility was explored by analyses (partial correlations) that yielded correlations between actual performance and each break variable while controlling for the effects of the other break variable. The partial correlations conducted gave confidence to the findings reported here for "number of breaks." However, those correlations suggested that results for "lowest break" (while not significantly different from 0-order correlations with available sample sizes) could have differed from reported if "number of breaks" had been systematically controlled.

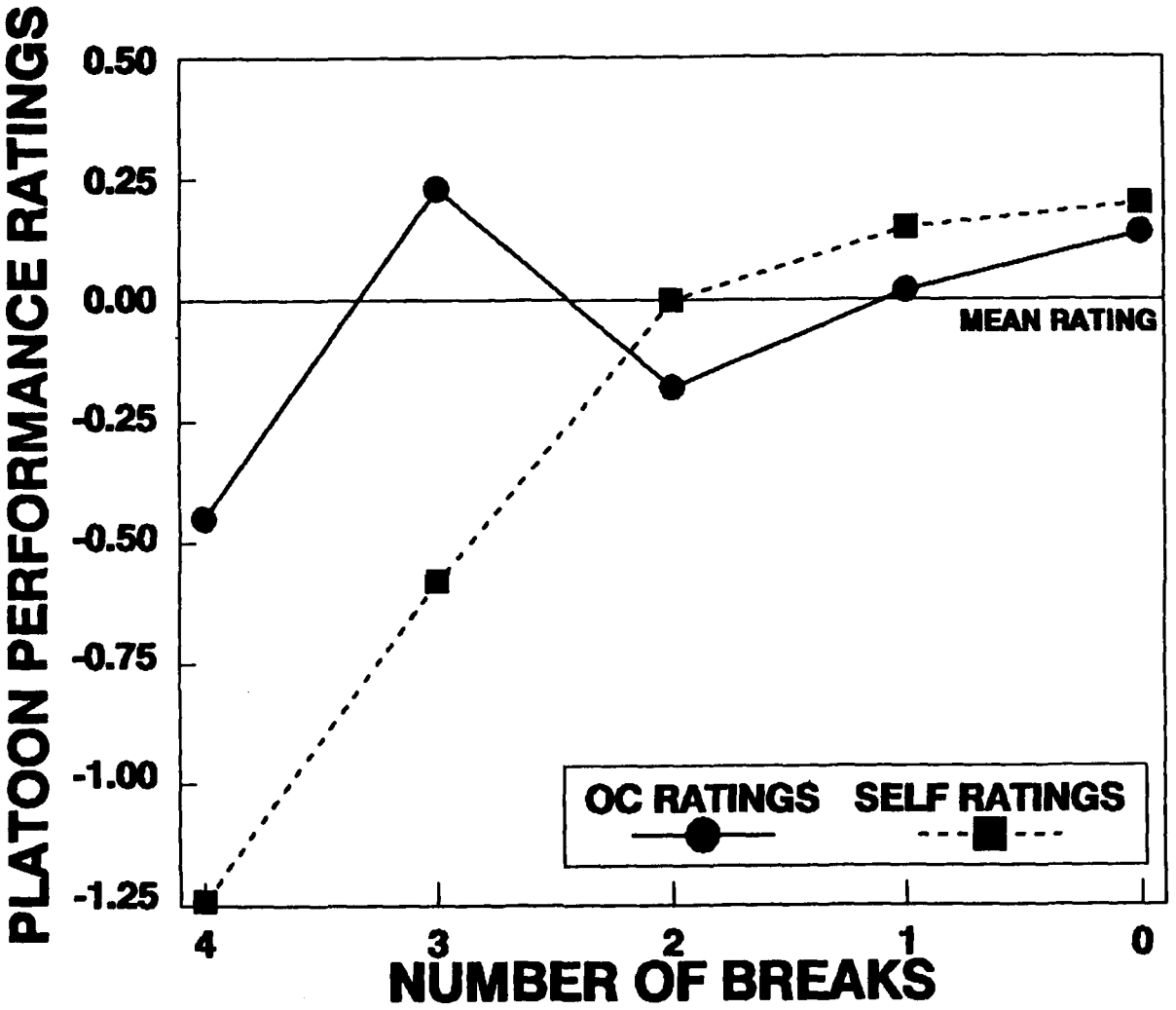

Figure 3. Number of Breaks in Vertical Cohesion by Platoon Performance Ratings

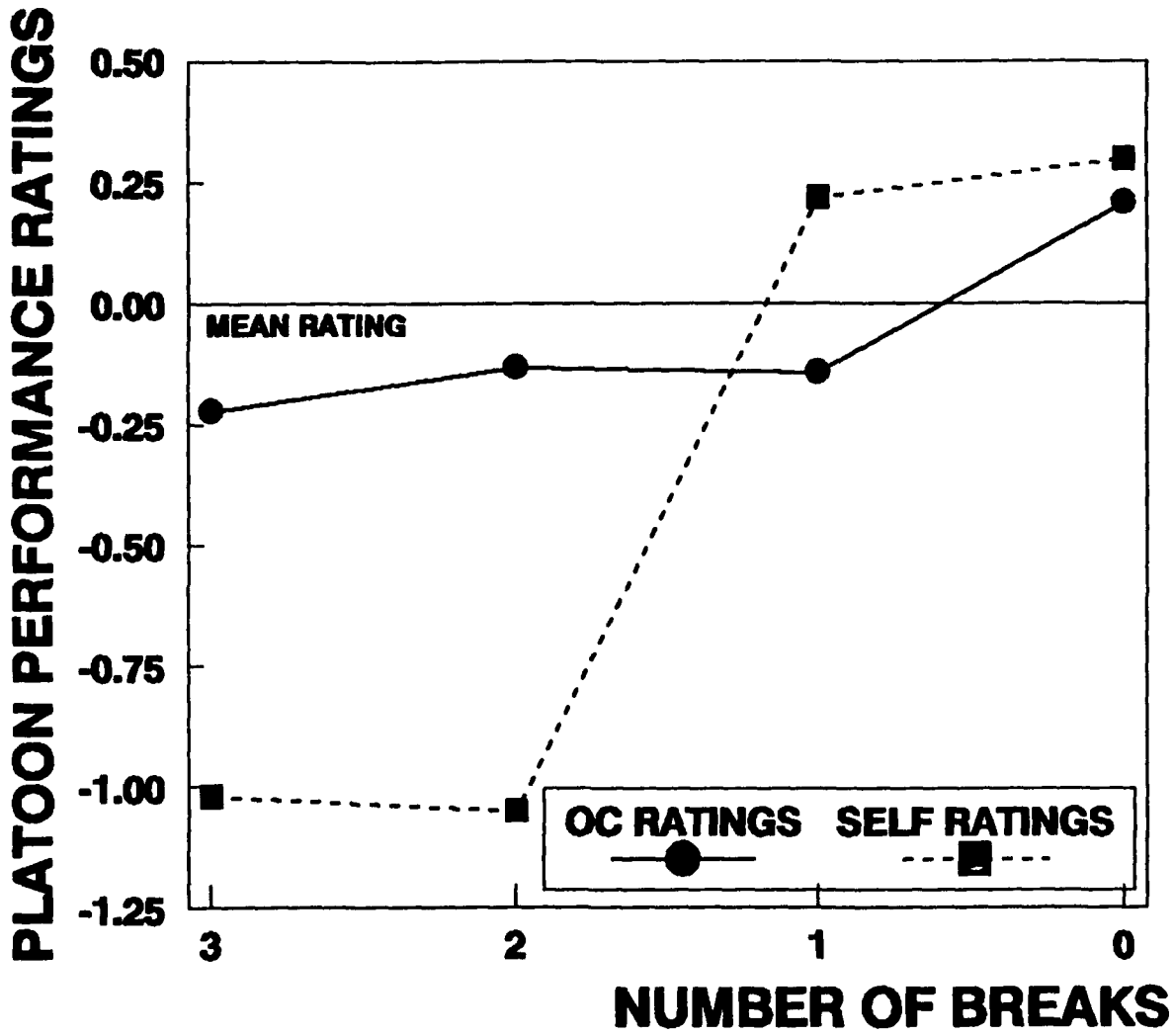

Figure 4. Number of Breaks in Vertical Cohesion by Platoon Performance Ratings

Discussion

Vertical cohesion with leaders is an effective predictor of performance. Spiegel (1944) noticed the same phenomenon where intense interpersonal relationships between soldiers and officers kept the men going and performing well in extremely trying circumstances. It was the explanation of why some units could outperform others. Quality leadership at the platoon level, composed of both technical ability (instrumental competency) and sincere caring for the soldiers made the difference.

Regarding the present research, several aspects of the results are noteworthy. First, vertical cohesion of subordinates with the platoon leadership (i.e., the platoon leader and the platoon sergeant) is predictive of platoon performance in a combat setting. Strong bonds between the subordinate and platoon level leader correlated with better performance. However, weak bonds (bonds were substantially below average) resulted in less successful performance.

Second, vertical cohesion with those leaders who were closest to the squad members (i.e., the squad leaders) generally was important in determining soldier perceptions of proficiency prior to battle. However, there was little correlation between the vertical cohesion of SMs and SLs and how they actually performed in a JRTC setting.

It appears, therefore, that each SL alone has minimal impact on ultimate platoon performance. The teaching of tasks within the platoon tends to be shared among all of the SLs. No one leader at the SL level has complete responsibility for his men. Soldiers accept the teaching from all the SLs within the platoon. It is possible that training is shared among the SLs such that a strong SL (an SL with good cohesion with the soldiers) could compensate for a weak SL who does not have the relationship with his men so that all SMs are trained effectively. Another potential explanation could be that the SL is more likely to be transferred within the platoon/company than higher leaders and, therefore, may be more familiar with the soldiers. However, the number of platoons in this situation was small so these conclusions must be considered tentative only.

Third, few or no breaks in the vertical cohesion chain resulted in better platoon performance than numerous breaks. As has been found in prior research, soldiers with strong bonds with their leaders feel more secure in their situation. They are best able to put forth the effort to function effectively. They tend to have the solidarity they need to function as a team to get the job done. They also have models to follow--leaders with whom they can identify and trust (Gal, 1986;

Kellett, 1987; Mitchell and Trickett, 1980). When those bonds with leaders have been weak, more casualties occurred (Mitchell and Trickett, 1980; Noy, 1987; Steiner and Neumann, 1978).

While vertical cohesion with the platoon level leadership appears to be the most important from the present research, the importance of the other leadership levels should not be underemphasized. Perhaps if the level of measurement of performance had been at the company or squad levels, these other leaders might have been shown to be more important. The cohesion literature reports that strong cohesion with higher leaders (Etzioni, 1975; Spiegel, 1944) or team or squad leaders (Noy, 1987) was crucial to performance. It would seem, then, that vertical cohesion must be strongest at the level of fighting with additional strong bonds at other levels in the chain for optimal performance.

It should be noted that in the present research, subordinates rated superiors to identify vertical cohesion. These ratings had a strong relationship with successful performance. This suggests placing greater emphasis on subordinate ratings.

The following recommendations are in order. First, the ratings should be only for the purpose of development of the leader (Warmke and Billings, 1979; Zedeck and Cascio, 1982) and not for performance appraisal. Otherwise a leader might want to please the subordinates in order to obtain a high performance rating. That could prevent a leader from making crucial decisions and result in a loss of optimal performance. Additionally, a subordinate seldom understands the entirety of a leader's job. Only a portion of the leader's performance is rated--that which the subordinate sees or which results in the satisfaction of the subordinate's needs (EcEvoy, 1987, Henderson, 1980; Mount, 1984b). If used for development, feedback from subordinates can allow the leader to better understand his relationship with his subordinates.

Second, the subordinates performing the ratings must have the ability to remain anonymous (Latham and Wexley, 1981). Without anonymity, fear of reprisal could lead to less than an honest appraisal of the relationship.

A possible limitation of the present work could be the inability to tap into the instrumental dimension of vertical cohesion. On the other hand, a method of estimating performance abilites of unseasoned soldiers would allow leaders to best place soldiers for success should an actual event occur.

A second limitation is the small number of battalions who were able to participate in the present research. However,

considering the directions of results, it is expected that a larger sample would only strengthen the results.

In summary, positive links in the vertical cohesion chain are important to platoon performance. Of most importance are the positions at platoon leadership (the PL and PS). In addition, fewer breaks along the chain from SM to CC provide for better platoon performance regardless of where those breaks occur. Care must be taken to ensure that leaders develop positive cohesive bonds with their troops to ensure success on the battlefield.

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Appendix A: Vertical Cohesion Scales

This appendix contains the items composing the eight vertical cohesion scales. The item number is based on the pre-rotation questionnaire.

VERTICAL COHESION SCALES

SCALE	ITEM*	DESCRIPTION
PS-PL		**PS RATING PL, VERTICAL BONDING**
	57	PL recognizes subordinates' accomplishments
	74	PL ensures that subordinates understand his instructions
	75	PL listens effectively/actively to subordinates
	85	PL delegates decision making to subordinates
	91	PL treats us fairly
	92	PL looks out for the welfare of his people
	94	PL is friendly and approachable
	98	PL pulls his share of the load in the field
	99	PL would have my confidence if we were in combat together
PS-CC		**PS RATING CC, VERTICAL BONDING**
	110	CC treats us fairly
	111	CC looks out for the welfare of his people
	113	CC is friendly and approachable
	117	CC pulls his share of the load in the field
	118	CC would have my confidence if we were in combat together
PL-CC		**PL RATING CC, VERTICAL BONDING**
	78	CC recognizes subordinates accomplishments
	96	CC ensures that subordinates understand his instructions
	97	CC listens effectively/actively to subordinates
	105	CC delegates decision making to subordinates
	111	CC treats us fairly
	112	CC looks out for the welfare of his people
	114	CC is friendly and approachable
	118	CC pulls his share of the load in the field
	119	CC would have my confidence if we were in combat together

SL-PL **SL RATING PL, VERTICAL BONDING**

84	PL recognizes subordinates accomplishments
102	PL ensures that subordinates understand his instructions
103	PL listens effectively/actively to subordinates
110	PL delegates decision making to subordinates
116	PL treats us fairly
117	PL looks out for the welfare of his people
119	PL is friendly and approachable
123	PL pulls his share of the load in the field
124	PL would have my confidence if we were in combat together

SL-PS **SL RATING PS, VERTICAL BONDING**

44	PS recognizes subordinates' accomplishments
59	PS ensures that subordinates understand his instructions
60	PS listens effectively/actively to subordinates
67	PS delegates decision making to subordinates
73	PS treats us fairly
74	PS looks out for the welfare of his people
76	PS is friendly and approachable
80	PS pulls his share of the load in the field
81	PS would have my confidence if we were in combat together

SM-PS **SM RATING PS, VERTICAL BONDING**

75	PS recognizes subordinates' accomplishments
90	PS ensures that subordinates understand his instructions
91	PS listens effectively/actively to subordinates
98	PS delegates decision making to subordinates
104	PS treats us fairly
105	PS looks out for the welfare of his people
107	PS is friendly and approachable
111	PS pulls his share of the load in the field
112	PS would have my confidence if we were in combat together

SM-PL **SM RATING PL, VERTICAL BONDING**

118	PL treats us fairly
119	PL looks out for the welfare of his people
121	PL is friendly and approachable
125	PL pulls his share of the load in the field
126	PL would have my confidence if we were in combat together

SM-SL **SM RATING SL, VERTICAL BONDING**

44	SL recognizes subordinates accomplishments
59	SL ensures that squad members understand his instructions
60	SL listens effectively/actively to subordinates
67	SL delegates decision making to subordinates
71	SL pulls his share of the load in the field
72	SL would have my confidence if we were in combat together

*item number based on pre questionnaire

Appendix B: Scale Statistics

The tables in Appendix B contain the scale means, standard deviations, and alpha coefficients (scale reliability) for each of the vertical cohesion scales at both the individual and platoon levels. In addition, the number of cases available for determining the scale statistics are listed.

Means and alpha coefficients were essentially identical between the individual and platoon levels. Platoon level standard deviations were approximately ½ of the individual level standard deviations. This finding was expected as the platoon level represents grouped responses. Means for scales were $3.32 \leq \bar{x} \leq 4.22$ with mean scores for ratings of PS-CC bonding being toward the high end of the range. The other scale means show no definite pattern. Alpha coefficients were high ($.91 \leq \alpha \leq .97$ for all cases except PSs rating PLs at baseline, which exhibited $\alpha = .83$ and PSs rating CCs at pre-rotation ($\alpha = .78$).

Table B-1

Scale Statistics, Individual Level Analysis

BASELINE					PRE-ROTATION				
SCALE	MEAN	SD	α	N	SCALE	MEAN	SD	α	N
SM-SL	3.45	1.06	.91	358	SM-SL	3.50	1.05	.93	347
SM-PS	3.51	1.14	.95	352	SM-PS	3.33	1.14	.95	343
SL-PS	3.73	1.16	.97	53	SL-PS	3.59	1.01	.93	56
SM-PL	3.91	1.07	.93	362	SM-PL	3.62	1.14	.93	333
SL-PL	3.61	.99	.94	50	SL-PL	3.51	.90	.94	54
PS-PL	3.96	.61	.83	21	PS-PL	3.97	.75	.93	18
PS-CC	4.12	.90	.91	16	PS-CC	4.22	.59	.78	16
PL-CC	4.20	.73	.92	18	PL-CC	3.32	1.02	.94	17

Table B-2

Scale Statistics, Platoon Level Analysis

BASELINE					PRE-ROTATION				
SCALE	MEAN	SD	α	N	SCALE	MEAN	SD	α	N
SM-SL	3.35	.43	.95	24	SM-SL	3.42	.57	.97	24
SM-PS	3.47	.71	.98	24	SM-PS	3.32	.78	.98	24
SL-PS	3.71	.97	.98	22	SL-PS	3.65	.74	.94	24
SM-PL	3.88	.52	.96	24	SM-PL	3.53	.72	.98	24
SL-PL	3.60	.80	.95	23	SL-PL	3.44	.77	.95	23
PS-PL	3.97	.60	.83	21	PS-PL	3.91	.94	.93	18
PS-CC	4.11	.91	.91	16	PS-CC	4.24	.56	.78	16
PL-CC	4.13	.79	.92	18	PL-CC	3.49	1.21	.94	17

Appendix C: Internal Characteristics

Tables in Appendix C contain descriptions of the internal characteristics of each vertical cohesion scale. The tables provide the questionnaire item number, the correlation of each item with the other scale items, and the correlation of each item with the total scale score. Correlations are given for both the individual and platoon levels for both the baseline and pre-rotation questionnaires.

In the tables, T1 refers to the correlation between the item and the scale mean as composed of all items; T2 refers to the correlation between the item and the scale mean calculated from all scale items except the particular item being correlated with the scale.

Overall, the scales held together well demonstrating high intra-scale correlations. Item-total correlations are also high.

Table C-1

Scale SM-SL
Vertical Bonding-Squad Members Rating their Squad Leaders
Items and Intra-Scale Correlations at the Individual Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BM44	BM59	BM60	BM67	BM71	BM72
BM59	.65					
BM60	.68	.68				
BM67	.64	.58	.64			
BM71	.59	.54	.59	.57		
BM72	.66	.59	.62	.60	.75	
T1	.85	.81	.85	.81	.82	.86
T2	.77	.72	.77	.72	.73	.78

Pre-Rotation Questionnaire

	PM44	PM59	PM60	PM67	PM71	PM72
PM59	.65					
PM60	.75	.77				
PM67	.74	.68	.75			
PM71	.62	.66	.66	.61		
PM72	.65	.66	.70	.66	.80	
T1	.86	.86	.89	.88	.85	.87
T2	.78	.79	.84	.79	.77	.80

Table C-2

Scale SM-SL
Vertical Bonding-Squad Members Rating their Squad Leaders
Items and Intra-Scale Correlations at the Platoon Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BM44	BM59	BM60	BM67	BM71	BM72
BM59	.78					
BM60	.69	.81				
BM67	.82	.87	.83			
BM71	.87	.77	.63	.80		
BM72	.86	.73	.64	.80	.89	
T1	.93	.83	.77	.91	.91	.91
T2	.89	.87	.77	.91	.87	.86

Pre-Rotation Questionnaire

	PM44	PM59	PM60	PM67	PM71	PM72
PM59	.78					
PM60	.85	.87				
PM67	.87	.84	.92			
PM71	.72	.86	.90	.84		
PM72	.76	.86	.87	.88	.92	
T1	.88	.94	.96	.95	.93	.94
T2	.83	.90	.95	.93	.91	.92

Table C-3

Scale SM-PS
Vertical Bonding-Squad Members Rating their Platoon Sergeants
Items and Intra-Scale Correlations at the Individual Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BM75	BM90	BM91	BM98	BM104	BM105	BM107	BM111	BM112
BM90	.67								
BM91	.75	.70							
BM98	.72	.68	.72						
BM104	.72	.56	.72	.68					
BM105	.70	.60	.68	.74	.83				
BM107	.66	.53	.68	.67	.79	.78			
BM111	.62	.70	.67	.67	.64	.68	.65		
BM112	.65	.66	.68	.67	.70	.72	.65	.80	
T1	.85	.80	.86	.85	.88	.88	.84	.84	.86
T2	.80	.74	.82	.81	.83	.85	.80	.80	.81

Pre-Questionnaire

	PM75	PM90	PM91	PM98	PM104	PM105	PM107	PM111	PM112
PM90	.67								
PM91	.73	.78							
PM98	.68	.73	.78						
PM104	.68	.62	.70	.64					
PM105	.64	.64	.72	.66	.85				
PM107	.59	.64	.67	.61	.75	.71			
PM111	.59	.68	.71	.64	.67	.72	.65		
PM112	.62	.69	.72	.65	.68	.71	.64	.84	
T1	.82	.84	.90	.85	.85	.86	.82	.84	.87
T2	.76	.80	.86	.79	.82	.83	.77	.81	.82

Table C-4

Scale SM-PS
Vertical Bonding-Squad Members Rating their Platoon Sergeant
Items and Intra-Scale Correlations at the Platoon Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BM75	BM90	BM91	BM98	BM104	BM105	BM107	BM111	BM112
BM90	.90								
BM91	.92	.89							
BM98	.94	.93	.96						
BM10	.92	.81	.91	.91					
BM105	.93	.89	.93	.94	.95				
BM107	.85	.74	.86	.85	.92	.92			
BM111	.88	.91	.88	.87	.79	.85	.70		
BM112	.87	.87	.87	.85	.79	.82	.67	.93	
T1	.96	.92	.95	.95	.94	.97	.88	.92	.90
T2	.96	.92	.96	.96	.93	.96	.85	.90	.88

Pre-Questionnaire

	PM75	PM90	PM91	PM98	PM104	PM105	PM107	PM111	PM112
PM90	.88								
PM91	.92	.95							
PM98	.91	.94	.95						
PM104	.88	.70	.79	.79					
PM105	.92	.86	.91	.91	.89				
PM107	.89	.81	.88	.85	.91	.93			
PM111	.84	.88	.93	.86	.79	.88	.82		
PM112	.87	.89	.93	.87	.74	.85	.79	.96	
T1	.96	.93	.98	.95	.87	.96	.93	.94	.93
T2	.94	.92	.97	.94	.85	.95	.91	.93	.92

Table C-5

Scale SL-PS
Vertical Bonding-Squad Leaders Rating their Platoon Sergeant
Items and Intra-Scale Correlations at the Individual Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BQ44	BQ59	PQ60	BQ67	BQ73	BQ74	BQ76	BQ80	BQ81
BQ59	.72								
BQ60	.77	.92							
BQ67	.76	.82	.80						
BQ73	.68	.82	.85	.76					
BQ74	.69	.84	.83	.75	.87				
BQ76	.64	.73	.73	.74	.78	.82			
BQ80	.63	.85	.75	.67	.85	.87	.72		
BQ81	.65	.81	.75	.73	.83	.83	.70	.85	
T1	.80	.93	.92	.85	.92	.91	.85	.89	.88
T2	.77	.92	.90	.84	.90	.91	.81	.86	.86

Pre-Rotation Questionnaire

	PQ44	PQ59	PQ60	PQ67	PQ73	PQ74	PQ76	PQ80	PQ81
PQ59	.79								
PQ60	.73	.74							
PQ67	.73	.74	.63						
PQ73	.67	.59	.61	.39					
PQ74	.67	.64	.50	.64	.69				
PQ76	.54	.53	.68	.52	.67	.62			
PQ80	.39	.54	.61	.34	.53	.51	.58		
PQ81	.55	.56	.66	.45	.64	.59	.72	.69	
T1	.89	.87	.89	.67	.79	.89	.85	.75	.88
T2	.79	.80	.81	.68	.74	.75	.75	.64	.75

Table C-6

Scale SL-PS
Vertical Bonding-Squad Leaders Rating their Platoon Sergeant
Items and Intra-Scale Correlations at the Platoon Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BQ44	BQ59	BQ60	BQ67	BQ73	BQ74	BQ76	BQ80	BQ81
BQ59	.79								
BQ60	.85	.93							
BQ67	.87	.86	.90						
BQ73	.78	.92	.92	.92					
BQ74	.80	.92	.88	.87	.91				
BQ76	.75	.84	.85	.85	.82	.87			
BQ80	.71	.89	.82	.85	.86	.85	.75		
BQ81	.75	.93	.87	.88	.92	.89	.79	.93	
T1	.88	.95	.95	.94	.95	.94	.91	.89	.91
T2	.83	.95	.94	.94	.95	.94	.87	.89	.93

Pre-Rotation Questionnaire

	PQ44	PQ59	PQ60	PQ67	PQ73	PQ74	PQ76	PQ80	PQ81
PQ59	.77								
PQ60	.81	.91							
PQ67	.79	.49	.52						
PQ73	.71	.60	.61	.17					
PQ74	.78	.67	.65	.65	.53				
PQ76	.69	.67	.74	.37	.75	.71			
PQ80	.39	.70	.66	.19	.32	.60	.58		
PQ81	.61	.77	.75	.52	.45	.79	.77	.82	
T1	.87	.90	.91	.61	.71	.86	.87	.72	.88
T2	.83	.87	.88	.53	.63	.82	.82	.65	.84

Table C-7

Scale SM-PL
Vertical Bonding-Squad Members Rating their Platoon Leader
Items and Intra-Scale Correlations at the Individual Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BM118	BM119	BM121	BM125	BM126
BM119	.84				
BM121	.80	.73			
BM125	.70	.74	.66		
BM126	.76	.74	.71	.72	
T1	.91	.91	.87	.85	.89
T2	.87	.85	.81	.78	.81

Pre-Rotation Questionnaire

	PM118	PM119	PM121	PM125	PM126
PM119	.84				
PM121	.75	.72			
PM125	.73	.75	.67		
PM126	.72	.77	.63	.75	
T1	.92	.91	.83	.87	.88
T2	.86	.87	.76	.81	.80

Table C-8

Scale SM-PL
Vertical Bonding-Squad Members Rating their Platoon Leader
Items and Intra-Scale Correlations at the Platoon Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BM118	BM119	BM121	BM125	BM126
BM119	.93				
BM121	.93	.88			
BM125	.74	.75	.75		
BM126	.84	.81	.80	.88	
T1	.94	.94	.95	.87	.89
T2	.93	.90	.90	.83	.89

Pre-Rotation Questionnaire

	PM118	PM119	PM121	PM125	PM126
PM119	.97				
PM121	.91	.90			
PM125	.88	.92	.83		
PM126	.88	.91	.85	.94	
T1	.96	.98	.94	.96	.95
T2	.95	.97	.90	.93	.93

Table C-9

Scale SL-PL
Vertical Bonding-Squad Leaders Rating their Platoon Leader Items and Intra-Scale Correlations at the Individual Level for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BQ84	BQ101	BQ102	BQ109	BQ115	BQ116	BQ118	BQ122	BQ123
BQ101	.77								
BQ102	.66	.85							
BQ109	.41	.70	.74						
BQ115	.68	.71	.73	.66					
BQ116	.73	.65	.55	.47	.85				
BQ118	.61	.53	.55	.49	.79	.75			
BQ122	.39	.59	.47	.45	.64	.65	.50		
BQ123	.66	.60	.64	.55	.79	.77	.70	.60	
T1	.80	.88	.86	.74	.90	.85	.78	.71	.85
T2	.74	.83	.79	.68	.90	.82	.74	.64	.81

Pre-Rotation Questionnaire

	PQ84	PQ102	PQ103	PQ110	PQ116	PQ117	PQ119	PQ123	PQ124
PQ102	.66								
PQ103	.63	.64							
PQ110	.61	.50	.77						
PQ116	.54	.64	.74	.61					
PQ117	.60	.44	.69	.57	.72				
PQ119	.47	.43	.65	.61	.74	.61			
PQ123	.67	.53	.67	.63	.60	.74	.59		
PQ124	.62	.63	.69	.67	.69	.70	.46	.72	
T1	.70	.77	.87	.74	.90	.80	.67	.77	.85
T2	.73	.67	.85	.76	.81	.78	.69	.79	.80

Table C-10

Scale SL-PL
Vertical Bonding-Squad Leaders Rating their Platoon Leader
Items and Intra-Scale Correlations at the Platoon Level
for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BQ84	BQ101	BQ102	BQ109	BQ115	BQ116	BQ118	BQ122	BQ123
BQ101	.78								
BQ102	.76	.89							
BQ109	.56	.75	.87						
BQ115	.78	.66	.83	.69					
BQ116	.89	.68	.74	.58	.82				
BQ118	.70	.60	.59	.66	.58	.69			
BQ122	.58	.79	.67	.47	.48	.49	.32		
BQ123	.76	.67	.83	.80	.75	.81	.61	.55	
T1	.88	.82	.90	.81	.89	.92	.77	.62	.89
T2	.85	.86	.93	.80	.82	.84	.69	.63	.86

Pre-Rotation Questionnaire

	PQ84	PQ102	PQ103	PQ110	PQ116	PQ117	PQ119	PQ123	PQ124
PQ102	.67								
PQ103	.78	.76							
PQ110	.78	.67	.81						
PQ116	.51	.62	.62	.50					
PQ117	.69	.57	.79	.69	.78				
PQ119	.50	.36	.53	.54	.78	.78			
PQ123	.73	.58	.71	.75	.51	.77	.66		
PQ124	.73	.82	.83	.80	.60	.76	.47	.79	
T1	.82	.76	.84	.81	.86	.92	.81	.79	.84
T2	.80	.74	.87	.83	.71	.87	.67	.82	.87

Table C-11

Scale PS-PL
Vertical Bonding-Platoon Sergeants Rating their Platoon Leader Items and Intra-Scale Correlations for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BS57	BS74	BS75	BS85	BS91	BS92	BS94	BS98	BS99
BS74	.62								
BS75	.36	.24							
BS85	.45	.24	.49						
BS91	.50	.11	.34	.32					
BS92	.47	.31	.21	.11	.59				
BS94	.46	.19	.28	.11	.72	.76			
BS98	.56	.48	.28	.11	.48	.56	.66		
BS99	.58	.32	.15	.25	.38	.34	.34	.74	
T1	.85	.67	.65	.51	.70	.74	.77	.80	.76
T2	.75	.46	.44	.39	.62	.57	.61	.68	.55

Pre-Rotation Questionnaire

	PS57	PS74	PS75	PS85	PS91	PS92	PS94	PS98	PS99
PS74	.83								
PS75	.74	.85							
PS85	.76	.84	.82						
PS91	.43	.45	.47	.63					
PS92	.50	.51	.46	.60	.86				
PS94	.43	.40	.41	.52	.81	.57			
PS98	.60	.59	.57	.59	.54	.67	.37		
PS99	.65	.58	.69	.64	.68	.53	.63	.68	
T1	.85	.86	.85	.88	.77	.86	.77	.83	.90
T2	.79	.81	.80	.86	.71	.69	.60	.71	.82

Table C-12

Scale PS-CC
Vertical Bonding-Platoon Sergeants Rating their Company Commander Items and Intra-Scale Correlations for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BS110	BS111	BS113	BS117	BS118
BS111	.81				
BS113	.71	.41			
BS117	.78	.86	.52		
BS118	.65	.79	.41	.87	
T1	.89	.92	.54	.96	.91
T2	.83	.86	.54	.92	.82

Pre-Rotation Questionnaire

	PS110	PS111	PS113	PS117	PS118
PS111	.72				
PS113	.40	.55			
PS117	.40	.34	.35		
PS118	.30	.37	.22	.70	
T1	.85	.87	.71	.88	.82
T2	.61	.64	.48	.62	.52

Table C-13

Scale PL-CC
Vertical Bonding-Platoon Leaders Rating their Company Commander Items and Intra-Scale Correlations for the Baseline and Pre-Rotation Questionnaires

Baseline Questionnaire

	BL78	BL96	BL97	BL105	BL111	BL112	BL114	BL118	BL119
BL96	.70								
BL97	.95	.76							
BL105	.53	.51	.59						
BL111	.51	.53	.58	.36					
BL112	.66	.68	.75	.59	.85				
BL114	.34	.28	.33	.34	.70	.60			
BL118	.54	.59	.49	.17	.74	.74	.55		
BL119	.68	.70	.69	.32	.67	.77	.21	.78	
T1	.83	.82	.89	.65	.80	.92	.60	.77	.82
T2	.81	.77	.84	.53	.76	.90	.50	.68	.77

Pre-Rotation Questionnaire

	PL78	PL96	PL97	PL105	PL111	PL112	PL114	PL118	PL119
PL96	.62								
PL97	.51	.58							
PL105	.73	.58	.70						
PL111	.28	.48	.68	.75					
PL112	.61	.65	.73	.89	.77				
PL114	.16	.38	.65	.54	.63	.53			
PL118	.55	.87	.75	.80	.73	.84	.66		
PL119	.37	.68	.75	.76	.76	.83	.65	.90	
T1	.62	.78	.81	.88	.77	.92	.67	.95	.89
T2	.58	.74	.80	.87	.76	.90	.61	.94	.86

Appendix D: Correlations

The tables in Appendix D contain correlations between the baseline and pre-rotation vertical cohesion scales for the same scale, correlations between scales where different levels of soldier rated a specific level of leader, and correlations where a specific group of soldier rated different levels of leader.

As all of these scales pertain to vertical cohesion along a specific leadership chain with soldiers rating associated/related leaders with like items, a degree of correlation between scales is expected and observed. However, these correlations are not so high as to suggest problems with multi-collinearity or a situation where soldiers were not discriminating among their leaders.

Table D-1

Correlations Between the Baseline and Pre-Rotation Vertical Cohesion Scales

Base/Pre Scale Correlations		
Scale	Individual Level	Platoon Level
SM-SL	.55***	.75***
SM-PS	.63***	.81***
SL-PS	.76***	.83***
SM-PL	.55***	.61***
SL-PL	.66***	.56**
PS-PL	.45	.23
PS-CC	-.05	.21
PL-CC	.57*	.50*

In the scale names, SM refers to "Squad Member", SL refers to "Squad Leader", PS refers to "Platoon Sergeant", PL refers to "Platoon Leader", CC refers to "Company Commander". The soldier listed first rated the second soldier.

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

Table D-2

Correlations of Levels of Soldier Rating Specific Leaders

Soldiers Rating Platoon Sergeant		
Scale	Baseline	Pre-Rotation
SM-PS/SL-PS	.80***	.69***
Soldiers Rating Platoon Leader		
Scale	Baseline	Pre-Rotation
SM-PL/SL-PL	.60***	.53**
SM-PL/PS-PL	.34	.47*
SL-PL/PS-PL	.26	.61**
Soldiers Rating Company Commander		
Scale	Baseline	Pre-Rotation
PS-CC/PL-CC	.77***	.07

In the scale names, SM refers to "Squad Member", SL refers to "Squad Leader", PS refers to "Platoon Sergeant", PL refers to "Platoon Leader", CC refers to "Company Commander". The soldier listed first rated the second soldier.

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

Table D-3

Correlations of Each Soldier Type and Their Ratings of Their Various Leaders

Squad Members Rating Their Leaders				
Scale	Individual Level		Platoon Level	
	Baseline	Pre-Rotation	Baseline	Pre-Rotation
SM-SL/ SM-PS	.21***	.37***	.09	.47*
SM-SL/ SM-PL	.33***	.35***	.28	.38*
SM-PS/ SM-PL	.38***	.52***	.24	.50**
Squad Leaders Rating Their Leaders				
Scale	Individual Level		Platoon Level	
	Baseline	Pre-Rotation	Baseline	Pre-Rotation
SL-PS/ SL-PL	.70***	.54**	.72***	.40*
Platoon Sergeants Rating Their Leaders				
Scale	Individual Level		Platoon Level	
	Baseline	Pre-Rotation	Baseline	Pre-Rotation
PS-PL/ PS-CC	.37	.11	.36	.00

In the scale names, SM refers to "Squad Member", SL refers to "Squad Leader", PS refers to "Platoon Sergeant", PL refers to "Platoon Leader", CC refers to "Company Commander". The soldier listed first rated the second soldier.

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

Appendix E: Factor Analysis

The tables in Appendix E contain the results of the confirmatory factor analysis of the items in the vertical cohesion scales. This analysis was performed to assure that the soldiers differentiated among their leaders.

All loadings that were greater than or equal to .40 are listed. Scale names refer to the prominent scale manifested by the factor. Scale names are listed in order of "Factor 1", "Factor 2", etc. Item number refers to the item number on the questionnaire; if only one number is present, the item number was the same for both baseline and pre-rotation questionnaires. If two numbers are given, the first refers to the baseline questionnaire item, the second refers to the pre-rotation questionnaire item. In either case, the wording of the item was the same.

For SMs' ratings of their leaders, each scale factored out separately at both baseline and pre-rotation. Squad Leaders ratings of their PS and PL had some slight overlap at baseline. At pre-rotation, each leader's scales factored separately; however, ratings of the PL factored into two factors with overlap. Platoon Sergeants' ratings of the CC factored separately; however, their ratings of PLs formed two factors with some overlap between each other for both baseline and pre-rotation. Platoon Leaders' ratings of the CC factored into two overlapping factors at baseline, at pre-rotation; however, only one factor was extracted. The factor analyses of ratings by PSs and PLs must be interpreted with caution as the N was insufficient to provide for stability of findings.

Table E-1

Factor Analysis of Vertical Cohesion Items that were rated by Squad Members

Factor Loadings of Vertical Cohesion Items after Verimax Rotation, Squad Members Rating their Leaders						
ITEM	Baseline			Pre-Rotation		
	SM-PS	SM-SL	SM-PL	SM-PS	SM-SL	SM-PL
I44		.85			.82	
I59		.78			.84	
I60		.85			.87	
I67		.78			.82	
I71		.80			.82	
I72		.83			.82	
I118			.89			.85
I119			.88			.86
I121			.84			.79
I125			.83			.85
I126			.84			.83
I75	.82			.77		
I90	.78			.79		
I91	.85			.84		
I98	.83			.77		
I104	.86			.84		
I105	.85			.84		
I107	.83			.81		
I111	.81			.82		
I112	.82			.83		

Note: 73.4% of the Variance Accounted for at Baseline,
74.2% of the Variance Accounted for at Pre-Rotation.

Table E-2

Factor Analysis of Vertical Cohesion Items that were rated by Squad Leaders

Factor Loadings of Vertical Cohesion Items after Verimax Rotation, Squad Leaders rating their Leaders					
ITEM	Baseline		Pre-Rotation		
	SL-PS	SL-PL	SL-PL	SL-PS	SL-PS
I44	.68	.41			.77
I59	.89			.41	.76
I60	.89			.56	.62
I67	.82				.89
I73	.89			.77	
I74	.87			.53	.56
I76	.82			.77	
I80	.80			.87	
I81	.77	.42		.80	
I84		.75	.67		
I101/102	.45	.77	.61		
I102/103	.46	.74	.86		
I109/110		.54	.81		
I115/116		.82	.79		
I116/117		.80	.79		
I118/119		.81	.77		
I122/123		.74	.86		
I123/124		.88	.82		

Note: 73.8% of the variance accounted for at baseline.
71.8% of the variance accounted for at pre-rotation.

Table E-3

Factor Analysis of Vertical Cohesion Items that were rated by Platoon Sergeants

Factor Loadings of Vertical Cohesion Items after Verimax Rotation, Platoon Sergeants rating their leaders						
ITEM	Baseline			Pre-Rotation		
	PS-PL	PS-CC	PS-PL	PS-PL	PS-CC	PS-PL
I110		.85			.70	
I111		.88			.85	
I113		.63			.62	
I117		.82			.83	
I118		.93			.83	
I57	.69		.61	.84		
I74	.48		.53	.90		
I75			.78	.90		
I85			.82	.75		.49
I91	.73					.89
I92	.81					.82
I94	.84					.66
I98	.88			.45		.59
I99	.78			.63		.62

Note: 74.7% of the variance accounted for at baseline.
75.1% of the variance accounted for at pre-rotation.

Table E-4

Factor Analysis of Vertical Cohesion Items that were rated by Platoon Leaders

Factor Loadings of Vertical Cohesion Items after Verimax Rotation, Platoon Leaders rating their leaders			
ITEM	Baseline		Pre-Rotation
	PL-CC	PL-CC	PL-CC
I78	.86		.71
I96	.77		.77
I97	.90		.84
I105	.75		.89
I111		.86	.84
I112	.57	.76	.94
I114		.76	.71
I118		.88	.94
I119	.56	.67	.92

Note: 77.6% of the variance accounted for at baseline.
71.4% of the variance accounted for at pre-rotation.

Appendix F: Performance Correlations

The tables in Appendix F show correlations between the predicted performance measures as rated by each level of soldier at both baseline and pre-rotation administrations of the questionnaire and the actual overall performance rating as determined by each group of soldier and observer/controller following the unit's rotation at the Combat Training Center.

Significant correlations are indicated by: * $p < .05$, ** $p < .01$, and *** $p < .001$. In addition, shading of cells also indicates statistical significance.

Raters of performance are signified in the following manner:
For single levels of rater: OC = Observer/Controller, CC = Company Commander, PL = Platoon Leader, PS = Platoon Sergeant, SL = Squad Leader, SM = Squad Member.
For groups of raters of different levels: L = Platoon Leader, S = Platoon Sergeant, Q = Squad Leader, M = Squad Member, C = Company Commander, O = Observer/Controller, PLT = platoon average of platoon leader, platoon sergeant, squad leader, and squad member. (For example, "CPLT" is a mean performance rating constructed from A) the CC score with a weight of 1 and B) the <u>mean</u> of the PL, PS, SL, and SM with a weight of 1.)

Table F-1

Correlations between the OC ratings and ratings by other raters or groups of raters

RATER (N)	OC RATING
CC (20)	.50*
PL (20)	.32
PS (16)	.75***
SL (19)	-.03
SM (14)	.35
LSQM (21)	.41*
OCPLT (23)	.78***
CPLT (23)	.49**
OCLSQM (23)	.66***
CLSQM (23)	.42*

Significant correlations are indicated by: * $p < .05$, ** $p < .01$, and *** $p < .001$. In addition, shading of cells also indicates statistical significance.

Raters of performance are signified in the following manner:
For single levels of rater: OC = Observer/Controller, CC = Company Commander, PL = Platoon Leader, PS = Platoon Sergeant, SL = Squad Leader, SM = Squad Member.
For groups of raters of different levels: L = Platoon Leader, S = Platoon Sergeant, Q = Squad Leader, M = Squad Member, C = Company Commander, O = Observer/Controller, PLT = platoon average of platoon leader, platoon sergeant, squad leader, and squad member. (For example, "CPLT" is a mean performance rating constructed from A) the CC score with a weight of 1 and B) the mean of the PL, PS, SL, and SM with a weight of 1.)

Table F-2

Correlations Between Predicted Overall Performance at Baseline and Actual Performance at the JRTC as Rated by the Various Groups of Raters

PERFORMANCE	SM PERF	SL PERF	PS PERF	PL PERF
OC	.52**	.15	.56**	-.20
CC	.44*	.15	.37	.16
PL	.54**	.25	.12	.09
PS	.53*	.23	.51*	-.02
SL	.08	.17	.10	-.10
SM	.51*	-.22	.67**	-.26
LSQM	.60**	.22	.40*	-.03
OCPLT	.62***	.24	.40*	.08
CPLT	.50**	.14	.41*	.21
OCLSQM	.62***	.19	.38*	.09
CLSQM	.48**	.12	.41*	.21

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Table F-3

Correlations Between Predicted Overall Performance at Pre-rotation and Actual Performance at the JRTC as Rated by the Various Groups of Raters

PERFORMANCE	SM PERF	SL PERF	PS PERF	PL PERF
OC	.21	.04	.35	-.08
CC	-.18	.42*	.17	.15
PL	.58**	.40*	.32	.15
PS	.43*	.34	.58*	.32
SL	.44*	.01	.40*	.02
SM	.56*	-.01	.82***	-.36
LSQM	.45*	.25	.62**	.02
OCPLT	.34	.42*	.46*	.05
CPLT	.25	.51**	.51**	.09
OCLSQM	.43*	.43*	.55**	.09
CLSQM	.33	.51**	.59**	.12

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Table F-4

Correlations Between Predicted Performance (Movement-to-Contact) at Baseline and Actual Overall Performance at the JRTC as Rated by the Various Raters

PERFORMANCE	SM MTC	SL MTC	PS MTC	PL MTC
OC	.51**	.19	.71***	-.19
CC	.42*	-.04	.58**	.24
PL	.57**	.29	.16	-.14
PS	.56**	.20	.55*	-.12
SL	.02	.27	-.06	-.15
SM	.40	.03	.32	-.37
LSQM	.56**	.30	.24	-.19
OCPLT	.62***	.22	.56**	.07
CPLT	.46*	.07	.49*	.24
OCLSQM	.62***	.23	.48*	.12
CLSQM	.41*	.09	.41*	.24

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Table F-5

Correlations Between Predicted Performance (Movement-to-Contact) at Pre-rotation and Actual Overall Performance at the JRTC as Rated by the Various Raters

PERFORMANCE	SM MTC	SL MTC	PS MTC	PL MTC
OC	.28	-.13	.34	.11
CC	.03	.18	.14	.08
PL	.55**	.39*	.62**	.34
PS	.52*	.19	.43	.58*
SL	.27	.33	.16	.12
SM	.51*	.05	.87***	-.21
LSQM	.43*	.35	.72***	.28
OCPLT	.42*	.33	.45*	.21
CPLT	.31	.44*	.56**	.22
OCLSQM	.49**	.41*	.50*	.23
CLSQM	.34	.51**	.59**	.26

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Table F-6

Correlations Between Predicted Performance (Defense) at Baseline and Actual Overall Performance at the JRTC as Rated by the Various Raters

PERFORMANCE	SM DEF	SL DEF	PS DEF	PL DEF
OC	.49**	-.12	.28	-.24
CC	.42*	.10	.00	.09
PL	.46*	.09	-.07	-.06
PS	.43*	.09	.23	-.17
SL	.09	-.03	-.06	-.22
SM	.40	-.40	.62**	-.35
LSQM	.49**	-.02	.19	-.28
OCPLT	.57**	.04	-.02	-.06
CPLT	.50**	.07	.03	.03
OCLSQM	.52**	-.04	-.06	-.14
CLSQM	.48**	.03	.04	-.02

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Table F-7

Correlations Between Predicted Performance (Defense) at Pre-rotation and Actual Overall Performance at the JRTC as Rated by the Various Raters

PERFORMANCE	SM DEF	SL DEF	PS DEF	PL DEF
OC	.08	.11	.24	-.07
CC	-.09	.34	.18	.26
PL	.59**	.48*	-.25	-.23
PS	.40	.48*	.45*	.16
SL	.42*	.06	.14	-.12
SM	.44*	-.20	.22	-.12
LSQM	.42*	.29	-.03	-.21
OCPLT	.25	.44*	.22	.02
CPLT	.27	.47*	.11	.09
OCLSQM	.33	.45*	.19	.08
CLSQM	.36*	.48**	.09	.08

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Table F-8

Correlations Between Predicted Performance (Deliberate Attack) at Baseline and Actual Overall Performance at the JRTC as Rated by the Various Raters

PERFORMANCE	SM DATK	SL DATK	PS DATK	PL DATK
OC	.40*	.39*	.41*	-.16
CC	.31	.19	.30	.07
PC	.41*	.49*	.21	.21
PS	.42*	.46*	.55*	-.05
SL	.23	.25	.42*	.07
SM	.64**	.19	.67**	-.20
LSQM	.62***	.52**	.53**	.16
OPLT	.50**	.51**	.44*	.07
CPLT	.42*	.35*	.49*	.18
OCLSQM	.55**	.47*	.51**	.13
CLSQM	.44*	.34	.55**	.23

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Table F-9

Correlations Between Predicted Performance (Deliberate Attack) at Pre-rotation and Actual Overall Performance at the JRTC as Rated by the Various Raters

PERFORMANCE	SM DATK	SL DATK	PS DATK	PL DATK
OC	.18	.24	.11	.04
CC	-.24	.40*	.05	.20
PL	.45*	.33	.20	.33
PS	.31	.36	.33	.52*
SL	.49*	-.13	.33	.11
SM	.60**	.13	.69**	-.21
LSQM	.40*	.23	.42*	.23
OCPLT	.28	.46*	.21	.21
CPLT	.19	.44*	.27	.26
OCLSQM	.39*	.44*	.32	.22
CLSQM	.29	.39*	.38	.27

* $p < .05$. ** $p < .01$. *** $p < .001$.
Shading of cells also indicates statistical significance.

Appendix G: Frequencies of Breaks

This appendix contains tables listing numbers of breaks and lowest break in the cohesion chain for each battalion and for the overall sample. Numbers for both the baseline and pre-rotation conditions are listed.

Table G-1

Baseline Frequency Distribution of Breaks by Battalion

LEVEL OF BREAK	PLT. FREQ.	FREQUENCY DISTRIBUTION OF BREAK POINTS BY BATTALION					
		BATTALION	LEVEL OF BREAK				
			SL	PS	PL	CC	NONE
SL	9						
PS	7	2	5	1	2	1	5
PL	8						
CC	5	6	4	6	6	4	2
NONE	7						

Table G-2

Pre-rotation Frequency Distribution of Breaks by Battalion

LEVEL OF BREAK	PLT. FREQ.	FREQUENCY DISTRIBUTION OF BREAK POINTS BY BATTALION					
		BATTALION	LEVEL OF BREAK				
			SL	PS	PL	CC	NONE
SL	7						
PS	7	2	3	1	0	4	5
PL	5						
CC	7	6	4	6	5	4	2
NONE	7						

Table G-3

Baseline Frequency Distribution of Lowest Break by Battalion

LEVEL OF LOWEST BREAK	PLT. FREQ.	FREQUENCY DISTRIBUTION OF LOWEST BREAK BY BATTALION					
		BATTALION	LEVEL OF LOWEST BREAK				
			SL	PS	PL	CC	NONE
SL	9						
PS	5	2	5	0	1	1	5
PL	2						
CC	1	6	4	5	1	0	2
NONE	7						

Table G-4

Pre-rotation Frequency Distribution of Lowest Break by Battalion

LEVEL OF LOWEST BREAK	PLT. FREQ.	FREQUENCY DISTRIBUTION OF LOWEST BREAK BY BATTALION					
		BATTALION	LEVEL OF LOWEST BREAK				
			SL	PS	PL	CC	NONE
SL	7						
PS	4	2	3	0	0	4	5
PL	2						
CC	4	6	4	4	2	0	2
NONE	7						

Table G-5

Baseline Frequency Distribution of Lowest Break by Battalion

LEVEL OF LOWEST BREAK	PLT. FREQ.	FREQUENCY DISTRIBUTION OF LOWEST BREAK BY BATTALION (SL BREAK NOT CONSIDERED)				
		BATTALION	LEVEL OF LOWEST BREAK			
			PS	PL	CC	NONE
PS	7	2	1	1	1	9
PL	4					
CC	1	6	6	3	0	3
NONE	12					

Note: SL not considered in analysis

Table G-6

Pre-rotation Frequency Distribution of Lowest Break by Battalion

LEVEL OF LOWEST BREAK	PLT. FREQ.	FREQUENCY DISTRIBUTION OF LOWEST BREAK BY BATTALION (SL BREAK NOT CONSIDERED)				
		BATTALION	LEVEL OF LOWEST BREAK			
			PS	PL	CC	NONE
PS	7	2	1	0	4	7
PL	2					
CC	4	6	6	2	0	4
NONE	11					

Note: SL not considered in analysis

Table G-7

Baseline Frequency Distribution for Total Number of Breaks by Battalion

TOTAL NUMBER OF BREAKS	PLT. FREQ.	FREQUENCY DISTRIBUTION FOR NUMBER OF BREAKS BY BATTALION					
		BATTALION	NUMBER OF BREAKS				
			0	1	2	3	4
0	7						
1	10	2	5	6	0	1	0
2	2						
3	5	6	2	4	2	4	0
4	0						

Table G-8

Pre-rotation Frequency Distribution for Total Number of Breaks by Battalion

TOTAL NUMBER OF BREAKS	PLT. FREQ.	FREQUENCY DISTRIBUTION FOR NUMBER OF BREAKS BY BATTALION					
		BATTALION	NUMBER OF BREAKS				
			0	1	2	3	4
0	7						
1	11	2	5	6	1	0	0
2	3						
3	1	6	2	5	2	1	2
4	2						

Table G-9

Baseline Frequency Distribution for Total Number of Breaks by Battalion

TOTAL NUMBER OF BREAKS	PLT. FREQ.	FREQUENCY DISTRIBUTION FOR NUMBER OF BREAKS BY BATTALION--SL NOT CONSIDERED				
		BATTALION	NUMBER OF BREAKS			
			0	1	2	3
0	12	2	9	2	1	0
1	5					
2	6	6	3	3	5	1
3	1					

Note: SL not considered in analysis

Table G-10

Pre-rotation Frequency Distribution for Total Number of Breaks by Battalion

TOTAL NUMBER OF BREAKS	PLT. FREQ.	FREQUENCY DISTRIBUTION FOR NUMBER OF BREAKS BY BATTALION--SL NOT CONSIDERED				
		BATTALION	NUMBER OF BREAKS			
			0	1	2	3
0	11	2	7	5	0	0
1	8					
2	2	6	4	3	2	3
3	3					

Note: SL not considered in analysis

Appendix H: Performance and Individual Break Correlations

Appendix H contains correlations between actual JRTC performance or expected performance and individual break groups regardless of what other levels of potential break were doing. Breaks were determined by requiring that the mean z-score (combination of different raters rating the specific leader) be less than $\underline{z} < -.5$.

Table H-1

Correlations of Expectations of Performance by Each of the Types of Rater for Those Platoons that Exhibited a Break at a Particular Level at Baseline

RATER & TYPE OF PERF	SL BREAK	PS BREAK	PL BREAK	CC BREAK
SM PERF	.34	.33	.66***	.34
SM MTC	.32	.42*	.61***	.33
SM DEF	.23	.18	.48**	.25
SM DATK	.38*	.24	.68***	.30
SL PERF	-.21	.30	.26	.26
SL MTC	-.07	.35*	.25	.09
SL DEF	-.39*	.22	.05	.11
SL DATK	.15	.36*	.46*	.26
PS PERF	-.05	.19	-.11	-.01
PS MTC	.11	.12	-.02	.21
PS DEF	-.04	-.07	-.33	-.27
PS DATK	-.11	.42*	.03	.01
PL PERF	-.20	.25	.15	.41*
PL MTC	-.28	.33	.02	.45*
PL DEF	-.06	.04	.09	.13
PL DATK	-.30	.22	.16	.48*

*$p < .05$. **$p < .01$. ***$p < .001$.
Shading also indicates statistical significance.

Table H-2

Correlations of Expectations of Performance by Each of the Types of Rater for Those Platoons that Exhibited a Break at a Particular Level at Pre-Rotation

RATER & TYPE OF PERF	SL BREAK	PS BREAK	PL BREAK	CC BREAK
SM PERF	.34	.42*	.32	.18
SM MTC	.42*	.43*	.35*	.19
SM DEF	.11	.38*	.15	.17
SM DATK	.34*	.37*	.34	.15
SL PERF	.09	.22	.37*	.30
SL MTC	.06	.23	.30	.20
SL DEF	.12	.20	.32	.17
SL DATK	.21	.38*	.42*	.27
PS PERF	.18	.41*	.18	-.04
PS MTC	.66***	.45*	.35	.17
PS DEF	-.09	-.09	-.15	.31
PS DATK	-.05	.39*	.08	-.30
PL PERF	.03	.03	.09	-.21
PL MTC	.15	.15	.12	-.18
PL DEF	.00	-.29	.20	-.12
PL DATK	.24	.24	.19	-.09

*$p < .05$. **$p < .01$. ***$p < .001$.
Shading also indicates statistical significance.

Table H-3

Correlations Between Performance as Rated by Each of the Raters and a Break at Each of the Specific Levels at Baseline

RATER	SL BREAK	PS BREAK	PL BREAK	CC BREAK
OC	.36*	.22	.09	.18
CC	-.23	.13	.10	.44*
PL	.28	.59**	.33	.21
PS	.06	.61**	.29	.11
SL	-.15	.31	.26	-.26
SM	.14	.32	.34	-.14
LSQM	.06	.64***	.44*	.07
OCPLT	.13	.49**	.28	.34
CPLT	-.12	.38*	.21	.35*
OCLSQM	.08	.61***	.31	.34*
CLSQM	-.14	.44*	.20	.30

*$p < .05$. **$p < .01$. ***$p < .001$.
Shading also indicates statistical significance.
Breaks at other levels may or may not have occurred; the only criterion for this analysis was that a break occur (or not occur) at that specific level.

Table H-4

Correlations Between Performance as Rated by Each of the Raters and a Break at Each of the Specific Levels at Pre-rotation

RATER	SL BREAK	PS BREAK	PL BREAK	CC BREAK
OC	.01	.14	.28	-.03
CC	-.33	-.05	.35	.14
PL	.34	.73***	.42*	-.06
PS	-.11	.63**	.51*	.26
SL	-.11	.20	-.07	-.27
SM	.37	.33	.39	.25
LSQM	.09	.68***	.43*	-.02
OCPLT	-.08	.39*	.54**	.11
CPLT	-.14	.26	.53**	.13
OCLSQM	-.05	.45*	.54**	.04
CLSQM	-.15	.32	.53**	.07

*$p < .05$. **$p < .01$. ***$p < .001$.
Shading also indicates statistical significance.
Breaks at other levels may or may not have occurred; the only criterion for this analysis was that a break occur (or not occur) at that specific level.

Appendix I: T-tests of Presence or Absence of Breaks

Tables in Appendix I show the results of *t*-tests for differences in platoon performance or expected platoon performance (as rated by observer/controllers and soldiers of all ranks) between the presence or absence of a break at each vertical cohesion level.

Statistical significance is indicated as follows: $*p<.05$, $**p<.01$. Shaded areas also indicate statistical significance.

Abbreviations of raters are as follows: SM = Squad Member; SL = Squad Leader; PS = Platoon Sergeant; PL = Platoon Leader; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM.

Performance abbreviations are: PERF = overall performance, MTC = movement-to-contact, DEF = defense, DATK = deliberate attack.

Table I-1

Baseline Results of t-test for Differences in Expected Platoon Performance Between the Presence or Absence of a Break at Each Vertical Cohesion Level

RATER & TYPE OF PERF	SL BREAK		PS BREAK		PL BREAK		CC BREAK	
	t	df	t	df	t	df	t	df
SM PERF	-1.68	22	-1.66	22	-4.08***	22	-1.69	22
SM MTC	-1.61	22	-2.18*	22	-3.60**	22	-1.64	22
SM DEF	-1.09	22	-.84	22	-2.56*	22	-1.20	22
SM DATK	-1.93	22	-1.18	22	-4.35***	22	-1.46	22
SL PERF	.98	21	-1.42	21	-1.26	21	-1.23	21
SL MTC	.34	21	-1.73	21	-1.19	21	-.42	21
SL DEF	1.92	21	-1.01	21	-.22	21	-.52	21
SL DATK	-.69	21	-1.77	21	-2.41*	21	-1.22	21
PS PERF	.24	20	-.87	20	.51	20	.05	20
PS MTC	-.48	19	-.54	19	.11	19	-.94	19
PS DEF	.17	20	.32	20	1.57	20	1.27	20
PS DATK	.48	19	-2.01	19	-.13	19	-.05	19
PL PERF	.92	21	-1.18	21	-.71	21	-2.08*	21
PL MTC	1.26	19	-1.52	19	-.10	19	-2.21*	19
PL DEF	.26	21	-.21	21	-.42	21	-.61	21
PL DATK	1.39	20	-1.03	20	-.70	20	-2.46*	20

Note: *$p<.05$. **$p<.01$. Shaded areas also indicate statistical significance. Abbreviations of raters are as follows: SM = Squad Member; SL = Squad Leader; PS = Platoon Sergeant; PL = Platoon Leader; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM. Performance abbreviations are: PERF = overall performance, MTC = movement to contact, DEF = defense, DATK = deliberate attack.

Table I-2

Pre-rotation Results of *t*-test for Differences in Expected Platoon Performance Between the Presence or Absence of a Break at Each Vertical Cohesion Level

RATER & TYPE OF PERF	SL BREAK		PS BREAK		PL BREAK		CC BREAK	
	t	df	t	df	t	df	t	df
SM PERF	-1.70	22	-2.20*	22	-1.57	22	-.84	22
SM MTC	-2.18*	22	-2.21*	22	-1.77	22	-.91	22
SM DEF	-.54	22	-1.93	22	-.73	22	-.80	22
SM DATK	-1.72	22	-1.84	22	-1.68	22	-.70	22
SL PERF	-.43	22	-1.05	22	-1.86	22	-1.47	22
SL MTC	-.29	22	-1.10	22	-1.48	22	-.96	22
SL DEF	-.57	22	-.96	22	-1.61	22	-.83	22
SL DATK	-.98	21	-1.86	21	-2.14*	21	-1.30	21
PS PERF	-.76	18	-1.92	18	-.77	18	.19	18
PS MTC	-3.69**	18	-2.16*	18	-1.58	18	-.74	18
PS DEF	.38	18	.38	18	.67	18	-1.37	18
PS DATK	.22	17	-1.74	17	-.32	17	1.31	17
PL PERF	-.11	19	-.11	19	-.39	19	.95	19
PL MTC	-.62	17	-.62	17	--	--	.77	17
PL DEF	.00	18	1.31	18	-.85	18	.53	18
PL DATK	-1.02	17	-1.02	17	--	--	.37	17

Note: *$p<.05$. **$p<.01$. Shaded areas also indicate statistical significance. Abbreviations of raters are as follows: SM = Squad Member; SL = Squad Leader; PS = Platoon Sergeant; PL = Platoon Leader; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM. Performance abbreviations are: PERF = overall performance, MTC = movement to contact, DEF = defense, DATK = deliberate attack.

Table I-3

Baseline Results of *t*-test for Differences in Platoon Performance Between the Presence or Absence of a Break at Each Vertical Cohesion Level

RATER	SL BREAK		PS BREAK		PL BREAK		CC BREAK	
	t	df	t	df	t	df	t	df
OC	-1.78	21	-1.05	21	-.40	21	-.85	21
CC	1.05	19	-.59	19	-.45	19	-2.14*	19
PL	-1.29	19	-3.15**	19	-1.53	19	-.95	19
PS	-.23	15	-3.01**	15	-1.16	15	.--	--
SL	.64	18	-1.38	18	-1.16	18	1.13	18
SM	-.50	13	-1.22	13	-1.32	13	.53	13
LSQM	-.27	20	-3.73***	20	-2.18*	20	-.34	20
OCPLT	-.63	22	-2.66*	22	-1.38	22	-1.71	22
CPLT	.55	22	-1.90	22	-1.01	22	-1.73	22
OCLSQM	-.40	22	-3.66***	22	-1.54	22	-1.72	22
CLSQM	.66	22	-2.28*	22	-.96	22	-1.50	22

Note: *$p<.05$. **$p<.01$. Shaded areas also indicate statistical significance. Abbreviations of raters are as follows: SM = Squad Member; SL = Squad Leader; PS = Platoon Sergeant; PL = Platoon Leader; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM.

Table I-4

Pre-rotation Results of *t*-test for Differences in Platoon Performance Between the Presence or Absence of a Break at Each Vertical Cohesion Level

RATER	SL BREAK		PS BREAK		PL BREAK		CC BREAK	
	t	df	t	df	t	df	t	df
OC	-.05	21	-.67	21	-1.31	21	.15	21
CC	1.54	19	.21	19	-1.63	19	-.60	19
PL	-1.58	19	-4.64***	19	-2.00	19	.25	19
PS	.44	15	-3.13**	15	-2.32*	15	-1.04	15
SL	.46	18	-.87	18	.31	18	1.19	18
SM	-1.44	13	-1.23	13	-1.52	13	-.92	13
LSQM	-.43	20	-4.14***	20	-2.15*	20	.10	20
OCPLT	.38	22	-1.97	22	-3.01**	22	-.50	22
CPLT	.65	22	-1.24	22	-2.90**	22	-.61	22
OCLSQM	.23	22	-2.36*	22	-3.08**	22	-.20	22
CLSQM	.69	22	-1.59	22	-2.92**	22	-.35	22

Note: *$p<.05$. **$p<.01$. Shaded areas also indicate statistical significance. Abbreviations of raters are as follows: SM = Squad Member; SL = Squad Leader; PS = Platoon Sergeant; PL = Platoon Leader; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM.

Appendix J: Correlations of Performance and Lowest Break or Number of Breaks

Appendix J contains tables listing the correlations between expected performance or actual performance at the CTCs with either the lowest break in the vertical cohesion chain (with and without the SL break in the analysis) or the number of breaks in the vertical cohesion chain (with and without the SL break in the analysis) at both baseline and pre-rotation.

Table J-1

Baseline Correlations Between Expected Overall Performance and Lowest Break or Number of Breaks

PREDICTED PERFORMANCE	LOW BREAK SL IN	LOW BREAK SL OUT	NUM BREAKS SL IN	NUM BREAKS SL OUT	N
SM PERF	.41*	.50**	-.71***	-.63***	24
SM MTC	.45*	.55**	-.71***	-.65***	24
SM DEF	.25	.33	-.48**	-.43*	24
SM DATK	.39*	.41*	-.68***	-.59***	24
SL PERF	-.03	.37*	-.25	-.38*	23
SL MTC	.04	.34	-.27	-.34	23
SL DEF	-.19	.25	.02	-.18	23
SL DATK	.21	.44*	-.53**	-.51**	23
PS PERF	-.04	-.04	.00	-.03	22
PS MTC	.17	.04	-.17	-.14	21
PS DEF	-.22	-.35	.30	.32	22
PS DATK	.06	.17	-.14	-.22	21
PL PERF	-.01	.35	-.23	-.38*	23
PL MTC	.01	.38*	-.20	-.37	21
PL DEF	.06	.20	-.08	-.12	23
PL DATK	-.17	.26	-.21	-.40*	22

Note: Correlations for both with the SL break included and excluded are listed. The following data refers to breaks as determined at baseline. Significant correlations are indicated by: * $p < .05$, ** $p < .01$, and *** $p < .001$. In addition, shading of cells also indicates statistical significance.

Abbreviations of raters are as follows: PL = Platoon Leader; PS = Platoon Sergeant; SL = Squad Leader; SM = Squad Member.

Performance abbreviations are: PERF = overall performance, MTC = movement-to-contact, DEF = defense, DATK = deliberate attack.

Table J-2

Correlations Between Predicted Performance and Lowest Break or Number of Breaks

PREDICTED PERFORMANCE	LOW BREAK SL IN	LOW BREAK SL OUT	NUM BREAKS SL IN	NUM BREAKS SL OUT	N
SM PERF	.42*	.39*	-.57**	-.49**	24
SM MTC	.48**	.41*	-.60***	-.49**	24
SM DEF	.29	.33	-.43*	-.44*	24
SM DATK	.38*	.33	-.53**	-.44*	24
SL PERF	.25	.31	-.37*	-.38*	24
SL MTC	.16	.27	-.31	-.32	24
SL DEF	.27	.29	-.30	-.28	24
SL DATK	.34	.45*	-.47*	-.43*	23
PS PERF	.30	.35	-.38	-.37	20
PS MTC	.57**	.33	-.65***	-.48*	20
PS DEF	.02	.08	-.02	-.06	20
PS DATK	.15	.30	-.17	-.21	19
PL PERF	.25	.17	.07	.10	21
PL MTC	.29	.20	-.02	.05	19
PL DEF	.11	.00	.13	.15	20
PL DATK	.50*	.36	-.21	-.09	19

Note: Correlations for both with the SL break included and excluded are listed. Significant correlations are indicated by: * $p < .05$, ** $p < .01$, and *** $p < .001$. In addition, shading of cells also indicates statistical significance.

Abbreviations of raters are as follows: PL = Platoon Leader; PS = Platoon Sergeant; SL = Squad Leader; SM = Squad Member.

Performance abbreviations are: PERF = overall performance, MTC = movement-to-contact, DEF = defense, DATK = deliberate attack.

Table J-3

Baseline Correlations Between Actual Performance at the JRTC and Lowest Break or Number of Breaks

PERFORMANCE	LOW BREAK SL IN	LOW BREAK SL OUT	NUM BREAK SL IN	NUM BREAK SL OUT	N
OC	.39*	.19	-.37*	-.23	23
CC	.06	.28	-.17	-.30	21
PL	.51**	.60**	-.59**	-.53**	21
PS	.24	.50*	-.49*	-.54*	17
SL	.04	.23	-.08	-.19	20
SM	.03	.15	-.27	-.26	15
LSQM	.28	.56**	-.51**	-.55**	22
OCPLT	.39*	.53**	-.52**	-.53**	24
CPLT	.18	.43*	-.33	-.43*	24
OCLSQM	.38*	.59***	-.56**	-.60***	24
CLSQM	.16	.44*	-.32	-.44*	24

Note: Correlations for both with the SL included and excluded are listed. Significant correlations are indicated by: * $p < .05$, ** $p < .01$, and *** $p < .001$. In addition, shading of cells also indicates statistical significance.

Abbreviations of raters are as follows: OC = Observer/Controller; CC = Company Commander; PL = Platoon Leader; PS = Platoon Sergeant; SL = Squad Leader; SM = Squad Member; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM.

Table J-4

Pre-rotation Correlations Between Actual Performance at the JRTC and Lowest Break or Number of Breaks

PERFORMANCE	LOW BREAK SL IN	LOW BREAK SL OUT	NUM BREAK SL IN	NUM BREAK SL OUT	N
OC	.10	.23	-.15	-.16	23
CC	-.07	.14	-.09	-.26	21
PL	.53**	.59**	-.56**	-.50*	21
PS	.20	.71***	-.54*	-.68***	17
SL	.03	.16	-.01	-.06	20
SM	.44	.33	-.56*	-.48*	15
LSQM	.33	.61***	-.54**	-.56**	22
OCPLT	.16	.50**	-.40*	-.49**	24
CPLT	.12	.36*	-.35*	-.46*	24
OCLSQM	.23	.57**	-.45*	-.53**	24
CLSQM	.13	.41*	-.37*	-.49**	24

Note: Correlations for both with the SL break included and excluded are listed. Significant correlations are indicated by: * $p < .05$, ** $p < .01$, and *** $p < .001$. In addition, shading of cells also indicates statistical significance.

Abbreviations of raters are as follows: OC = Observer/Controller; CC = Company Commander; PL = Platoon Leader; PS = Platoon Sergeant; SL = Squad Leader; SM = Squad Member; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM.

Appendix K: Z-score Performance Means

This appendix contains tables that list the z-score performance means for groups as determined by 1) where the lowest break in vertical cohesion occurred and by 2) the number of breaks that occur in the vertical cohesion chain.

Means for both predicted performance (as rated during baseline and pre-rotation questionnaires administrations) and actual performance (as rated following rotation to the JRTC) are listed.

Platoons were assigned to break groups on the basis of vertical cohesion ratings at the time of questionnaire administration.

Abbreviations of raters in actual performance tables are as follows: OC = Observer/Controller; CC = Company Commander; PL = Platoon Leader; PS = Platoon Sergeant; SL = Squad Leader; SM = Squad Member; LSQM = mean of SM, SL, PS, PL; OCPLT = mean of OC, CC, and LSQM; CPLT = mean of CC and LSQM; OCLSQM = mean of OC, CC, PL, PS, SL, and SM; CLSQM = mean of CC, PL, PS, SL, and SM.

Abbreviations of raters in expected performance tables are as follows: PL = Platoon Leader; PS = Platoon Sergeant; SL = Squad Leader; SM = Squad Member.

Performance abbreviations are: PERF = overall performance, MTC = movement-to-contact, DEF = defense, DATK = deliberate attack.

Table K-1

Baseline Predicted Performance Z-score Means as Determined by the Location of the Lowest Break

PREDICTED PERFORMANCE	LEVEL OF LOWEST BREAK					p
	SL	PS	PL	CC	NONE	
SM PERF	-.42	-.17	.26	.76	.48	.402
SM MTC	-.41	-.30	.20	.86	.56	.293
SM DEF	-.28	-.09	.33	.53	.26	.805
SM DATK	-.48	.03	.18	.81	.42	.419
SL PERF	.27	-.32	-.17	-2.23	.28	.138
SL MTC	.09	-.20	.00	-1.56	.26	.558
SL DEF	.51	-.42	-.30	-1.90	.06	.128
SL DATK	-.19	-.05	.09	-1.30	.42	.545
PS PERF	.06	-.48	1.24	-.08	-.17	.400
PS MTC	-.13	-.30	.69	-.63	.25	.726
PS DEF	.04	.11	1.36	-.51	-.51	.227
PS DATK	.13	-.99	1.09	1.09	-.06	.081
PL PERF	.24	-.66	.09	-.66	.13	.616
PL MTC	.38	-.90	.09	-.57	.19	.308
PL DEF	.06	-.18	-.49	-.49	.23	.886
PL DATK	.38	-.63	.52	-.63	-.13	.450

Note: SL breaks are included in the analysis.

Table K-2

Pre-rotation Predicted Performance Z-score Means as Determined by the Location of the Lowest Break

PREDICTED PERFORMANCE	LEVEL OF LOWEST BREAK					p
	SL	PS	PL	CC	NONE	
SM PERF	-.52	-.30	-.05	.54	.40	.353
SM MTC	-.64	-.15	-.14	.45	.51	.224
SM DEF	-.17	-.70	.15	.38	.31	.500
SM DATK	-.52	-.14	-.19	.62	.30	.386
SL PERF	-.13	-.29	-.62	.05	.45	.637
SL MTC	-.09	-.22	-.36	.14	.24	.922
SL DEF	-.18	-.24	-.67	.11	.45	.615
SL DATK	-.34	-.20	-.61	.23	.45	.536
PS PERF	-.29	-.59	-.09	.52	.18	.630
PS MTC	-1.10	.02	.59	.59	.35	.042
PS DEF	.15	.05	-.45	-.83	.41	.389
PS DATK	.10	-.91	-.17	.65	-.01	.389
PL PERF	-.04	-.39	-.83	-.06	.48	.512
PL MTC	-.33	-.33	-.33	.06	.34	.822
PL DEF	.00	.57	-1.33	-.38	.43	.181
PL DATK	-.54	-.54	-.54	-.11	.68	.225

Note: SL break included in the analysis. The leader in the horizontal heading refers to the location of the lowest break within each cohesion chain.

Table K-3

Baseline Predicted Performance Z-score Means as Determined by the Location of the Lowest Break

PREDICTED PERFORMANCE	LEVEL OF LOWEST BREAK				p
	PS	PL	CC	NONE	
SM PERF	-.50	-.72	.76	.47	.052
SM MTC	-.64	-.58	.86	.49	.033
SM DEF	-.26	-.64	.53	.32	.299
SM DATK	-.37	-.72	.81	.39	.128
SL PERF	-.43	.04	-2.23	.43	.022
SL MTC	-.52	.34	-1.56	.34	.094
SL DEF	-.31	.15	-1.90	.30	.128
SL DATK	-.53	-.15	-1.30	.45	.088
PS PERF	-.30	.84	-.08	-.13	.323
PS MTC	-.19	.36	-.63	.03	.78
PS DEF	.11	1.05	-.51	-.39	.074
PS DATK	-.64	.74	1.09	-.01	.103
PL PERF	-.40	-.28	-.66	.35	.371
PL MTC	-.57	-.12	-.57	.31	.376
PL DEF	-.07	-.49	-.49	.24	.601
PL DATK	-.40	-.05	-.63	.23	.623

Note: SL breaks are excluded from the analysis

Table K-4

Pre-rotation Predicted Performance Z-score Means as Determined by the Location of the Lowest Break

PREDICTED PERFORMANCE	LEVEL OF LOWEST BREAK				p
	PS	PL	CC	NONE	
SM PERF	-.64	-.05	.54	.22	.198
SM MTC	-.65	-.14	.45	.27	.198
SM DEF	-.58	.15	.38	.19	.342
SM DATK	-.55	-.19	.62	.16	.258
SL PERF	-.33	-.62	.05	.30	.482
SL MTC	-.34	-.36	.14	.23	.642
SL DEF	-.30	-.67	.11	.27	.507
SL DATK	-.61	-.61	.23	.36	.191
PS PERF	-.69	-.09	.52	.14	.308
PS MTC	-.76	.59	.59	.08	.188
PS DEF	.15	-.45	-.83	.30	.266
PS DATK	-.73	-.17	.65	.04	.281
PL PERF	-.04	-.83	-.06	.21	.627
PL MTC	-.33	-.33	.06	.14	.877
PL DEF	.57	-1.33	-.38	.19	.108
PL DATK	-.54	-.54	-.11	.31	.505

Note: The SL break in excluded from the analysis.

Table K-5

Baseline Predicted Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PREDICTED PERFORMANCE	NUMBER OF BREAKS					p
	NONE	1	2	3	4	
SM PERF	.48	.49	-1.12	-1.22	XXX	.000
SM MTC	.56	.42	-1.15	-1.18	XXX	.000
SM DEF	.26	.43	-1.06	-.81	XXX	.034
SM DATK	.42	.50	-.85	-1.26	XXX	.000
SL PERF	.28	-.00	-.01	-.47	XXX	.722
SL MTC	.26	.05	-.13	-.52	XXX	.683
SL DEF	.06	-.09	-.05	.13	XXX	.982
SL DATK	.42	.14	.31	-1.24	XXX	.034
PS PERF	-.17	.21	-.34	-.03	XXX	.863
PS MTC	.25	.03	-.63	-.10	XXX	.769
PS DEF	-.51	.04	.74	.23	XXX	.417
PS DATK	-.06	.39	-.99	-.15	XXX	.352
PL PERF	.13	.20	-1.17	-.35	XXX	.492
PL MTC	.19	.09	-1.91	-.12	XXX	.265
PL DEF	.23	-.11	-.49	.01	XXX	.877
PL DATK	-.13	.41	-.63	-.63	XXX	.289

Note: Breaks could have occurred at any or all of the following breaks: SL, PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred. While the potential existed for four breaks to occur within a vertical cohesion chain, no platoon exhibited four breaks.

Table K-6

Pre-rotation Predicted Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PREDICTED PERFORMANCE	NUMBER OF BREAKS					p
	NONE	1	2	3	4	
SM PERF	.40	.15	-.14	-.21	-1.91	.045
SM MTC	.51	.12	-.36	.04	-1.94	.023
SM DEF	.31	.09	.03	-.53	-1.40	.295
SM DATK	.30	.20	-.11	-.42	-1.82	.072
SL PERF	.45	-.24	.95	-.54	-1.42	.036
SL MTC	.24	-.07	.61	.22	-1.47	.197
SL DEF	.45	-.28	.76	.18	-1.25	.111
SL DATK	.45	-.08	.75	-.89	-1.44	.089
PS PERF	.18	.28	-1.09	XXX	-.84	.188
PS MTC	.35	.21	-.25	XXX	-1.96	.013
PS DEF	.41	-.45	.30	XXX	.30	.348
PS DATK	-.01	.31	-1.28	XXX	-.18	.241
PL PERF	.48	-.52	-.39	1.35	.48	.128
PL MTC	.34	-.33	-.33	1.25	XXX	.322
PL DEF	.43	-.59	-.38	1.52	.57	.083
PL DATK	.68	-.54	-.54	1.17	XXX	.030

Note: Breaks could have occurred at any or all of the following breaks: SL, PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred.

Table K-7

Baseline Predicted Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PREDICTED PERFORMANCE	NUMBER OF BREAKS				p
	NONE	1	2	3	
SM PERF	.47	.53	-1.39	.00	.000
SM MTC	.49	.44	-1.33	-.18	.000
SM DEF	.32	.44	-1.13	.59	.006
SM DATK	.39	.66	-1.29	-.25	.000
SL PERF	.43	-.65	-.19	-.93	.138
SL MTC	.34	-.36	-.36	-.52	.405
SL DEF	.30	-.82	.16	-.42	.185
SL DATK	.45	-.22	-.69	-.87	.103
PS PERF	-.13	.57	.04	-1.14	.439
PS MTC	.03	.36	-.19	-.63	.789
PS DEF	-.39	.42	.53	-.51	.220
PS DATK	-.01	.74	-.18	-1.69	.145
PL PERF	.35	-.25	-.46	-.66	.361
PL MTC	.31	-.30	-.57	-.57	.415
PL DEF	.24	-.49	-.24	.77	.435
PL DATK	.23	.06	-.34	-1.80	.224

Note: A break at the SL level was excluded from this analysis. Breaks could have occurred at any or all of the following breaks: PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred.

Table K-8

Pre-rotation Predicted Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PREDICTED PERFORMANCE	NUMBER OF BREAKS				p
	NONE	1	2	3	
SM PERF	.22	.31	-.47	-1.35	.050
SM MTC	.27	.22	-.50	-1.28	.070
SM DEF	.19	.32	-.73	-1.11	.096
SM DATK	.16	.37	-.34	-1.36	.052
SL PERF	.30	-.14	.58	-1.13	.118
SL MTC	.23	-.03	.22	-.90	.383
SL DEF	.27	-.20	.47	-.77	.347
SL DATK	.36	-.24	.75	-1.25	.036
PS PERF	.14	.39	-1.09	-.84	.172
PS MTC	.08	.59	-.25	-1.95	.006
PS DEF	.30	-.71	.30	.30	.235
PS DATK	.04	.38	-1.28	-.17	.244
PL PERF	.21	-.58	-.39	.77	.185
PL MTC	.14	-.33	-.33	1.25	.479
PL DEF	.19	-.70	-.38	.89	.108
PL DATK	.31	-.54	-.54	1.17	.193

Note: A break at the SL level was excluded from this analysis. Breaks could have occurred at any or all of the following breaks: PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred.

Table K-9

Baseline Actual Performance Z-score Means as Determined by the Location of the Lowest Break

PERFORMANCE	LEVEL OF LOWEST BREAK					p
	SL	PS	PL	CC	NONE	
OC	-.44	-.17	1.00	.05	.46	.276
CC	.32	-.79	-.34	-.13	.24	.445
PL	-.39	-.87	.82	.27	.61	.062
PS	-.06	-.86	.71	XXX	.32	.294
SL	.19	-.66	-.35	.50	.11	.742
SM	-.21	-.03	1.06	1.02	-.21	.687
LSQM	-.07	-.91	.64	.60	.34	.257
OCPLT	-.16	-.78	.52	.25	.58	.167
CPLT	.14	-.87	.15	.25	.35	.294
OCLSQM	-.10	-.97	.71	.46	.56	.062
CLSQM	.17	-.97	.39	.40	.30	.182

Table K-10

Pre-rotation Actual Performance Z-score Means as Determined by the Location of the Lowest Break

PERFORMANCE	LEVEL OF LOWEST BREAK					p
	SL	PS	PL	CC	NONE	
OC	-.01	-.07	-.81	.25	.14	.809
CC	.58	-.54	-.97	-.13	.16	.330
PL	-.59	-.87	.48	.96	.30	.029
PS	.14	-.86	-.77	.15	.43	.446
SL	.18	-.66	-.42	.53	-.08	.626
SM	-.50	-.03	-.37	1.02	.50	.535
LSQM	-.15	-.91	-.42	.90	.19	.110
OCPLT	.12	-.55	-1.15	.43	.27	.264
CPLT	.21	-.64	-1.09	.40	.23	.251
OCLSQM	.07	-.66	-1.30	.63	.31	.093
CLSQM	.22	-.75	-1.11	.57	.20	.142

Table K-11

Baseline Actual Performance Z-score Means as Determined by the Location of the Lowest Break

PERFORMANCE	LEVEL OF LOWEST BREAK				p
	PS	PL	CC	NONE	
OC	-.33	.14	.05	.15	.798
CC	-.23	-.62	-.13	.26	.537
PL	-1.02	-.07	.27	.46	.036
PS	-1.07	.33	XXX	.32	.036
SL	-.60	.14	.50	.12	.617
SM	-.43	.45	1.02	-.03	.492
LSQM	-1.15	.15	.60	.37	.017
OCPLT	-.75	-.12	.25	.45	.073
CPLT	-.57	-.20	.25	.38	.238
OCLSQM	-.93	.10	.46	.47	.016
CLSQM	-.66	-.01	.40	.36	.183

Note: SL breaks are not included in the analysis.

Table K-12

Pre-rotation Actual Performance Z-score Means as Determined by the Location of the Lowest Break

PERFORMANCE	LEVEL OF LOWEST BREAK				p
	PS	PL	CC	NONE	
OC	-.21	-.81	.25	.21	.528
CC	.09	-.97	-.13	.19	.522
PL	-1.12	.48	.96	.23	.001
PS	-.94	-.77	.15	.57	.023
SL	-.34	-.42	.53	-.00	.630
SM	-.38	-.37	1.02	.23	.521
LSQM	-1.08	-.42	.90	.30	.002
OCPLT	-.59	-1.15	.44	.43	.036
CPLT	-.39	-1.10	.40	.30	.159
OCLSQM	-.68	-1.30	.63	.44	.005
CLSQM	-.49	-1.11	.57	.31	.079

Note: SL breaks were not included in the analysis.

Table K-13

Baseline Actual Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PERFORMANCE	NUMBER OF BREAKS					p
	NONE	1	2	3	4	
OC	.46	.07	-.40	-.53	XXX	.402
CC	.24	.00	-.97	.04	XXX	.535
PL	.61	.06	-1.23	-.90	XXX	.042
PS	.32	.21	-1.48	-1.06	XXX	.135
SL	.11	.09	-2.51	.29	XXX	.064
SM	-.21	.91	-1.33	-.54	XXX	.034
LSQM	.34	.32	-2.32	-.83	XXX	.007
OCPLT	.58	.17	-1.33	-.64	XXX	.026
CPLT	.35	.19	-1.54	-.27	XXX	.081
OCLSQM	.56	.31	-1.93	-.64	XXX	.000
CLSQM	.30	.27	-1.81	-.24	XXX	.027

Note: Breaks could have occurred at any or all of the following breaks: SL, PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred.

Table K-14

Pre-rotation Actual Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PERFORMANCE	NUMBER OF BREAKS					p
	NONE	1	2	3	4	
OC	.14	.02	-.18	.23	-.45	.958
CC	.16	-.15	.34	-.66	XXX	.769
PL	.30	.33	-.90	-.04	-1.63	.049
PS	.43	.26	-1.08	XXX	-1.06	.090
SL	-.08	.24	-.91	XXX	.14	.550
SM	.50	.30	-.62	-.41	-1.09	.310
LSQM	.19	.46	-1.32	-.55	-1.42	.016
OCPLT	.27	.13	-.18	-.29	-1.29	.391
CPLT	.23	.07	.17	-.59	-1.19	.465
OCLSQM	.31	.20	-.50	-.52	-1.22	.273
CLSQM	.20	.15	-.00	-.58	-1.24	.433

Note: Breaks could have occurred at any or all of the following breaks: SL, PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred.

Table K-15

Baseline Actual Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PERFORMANCE	NUMBER OF BREAKS				p
	NONE	1	2	3	
OC	.15	.35	-.61	.23	.374
CC	.26	-.34	-.28	-.66	.584
PL	.46	-.05	-1.20	-.04	.026
PS	.32	.08	-1.20	XXX	.054
SL	.12	.06	-.41	XXX	.676
SM	-.03	.92	-.77	-.41	.092
LSQM	.37	.22	-1.27	-.55	.018
OCPLT	.45	.07	-.92	-.29	.036
CPLT	.38	-.02	-.64	-.59	.206
OCLSQM	.47	.28	-1.09	-.52	.005
CLSQM	.36	.10	-.71	-.58	.168

Note: Breaks at the SL level were not included in the analysis. Breaks could have occurred at any or all of the following breaks: PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred.

Table K-16

Pre-rotation Actual Performance Z-score Means as Separated by the Number of Levels of Break per Platoon

PERFORMANCE	NUMBER OF BREAKS				p
	NONE	1	2	3	
OC	.21	-.14	-.13	-.22	.867
CC	.19	-.06	-.47	-.66	.750
PL	.23	.45	-.90	-1.10	.053
PS	.57	-.22	-1.08	-1.06	.029
SL	-.00	.25	-.91	.14	.587
SM	.23	.73	-.62	-.87	.160
LSQM	.30	.45	-1.32	-1.13	.010
OCPLT	.42	-.06	-.62	-.96	.127
CPLT	.30	.17	-.84	-.99	.122
OCLSQM	.44	-.01	-.90	-.99	.066
CLSQM	.30	.22	-1.05	-1.02	.066

Note: Breaks at the SL level were not included in the analysis. Breaks could have occurred at any or all of the following breaks: PS, PL, CC. No indication of where breaks occurred may be found in this table, only the number of breaks regardless of where they occurred.

Appendix L: Regression Analysis

This appendix contains the regression analysis with break predictors for each of the rater/rater groups for both baseline and pre-rotation break groupings.

Table L-1

Baseline Regression Analysis (Beta Weights) with Break Predictors for Each of the Rater/Rater Groups

RATER	BETA	PREDICTOR	R SQUARE	F	df
OC	.50	SL BREAK	.25	6.51*	1,20
CC	.52	CC BREAK	.27	6.82*	1,18
PL	.59	PS BREAK	.35	9.58**	1,18
PS	XXX				
SL	XXX				
SM	XXX				
LSQM	.68	PS BREAK	.47	16.65***	1,19
OCPLT	.49	PL BREAK	.24	6.67*	1,21
CPLT	.43	CC BREAK	.19	4.89*	1,21
OCSLQM	.53 .40	PS BREAK CC BREAK	.44	7.86**	2,20
CLSQM	XXX				

Note: Predictors were entered in a stepwise manner.
* $p < .05$. ** $p < .01$. *** $P < .001$.

Table L-2

Pre-rotation Regression Analysis (Beta Weights) with Break Predictors for Each of the Rater/Rater Groups

RATER	BETA	PREDICTOR	R SQUARE	F	df
OC	XXX				
CC	.49	PL BREAK	.24	5.29*	1,17
PL	.68	PS BREAK	.46	16.22***	1,19
PS	.60	PS BREAK	.32	6.73*	1,14
SL	XXX				
SM	XXX				
LSQM	.67	PS BREAK	.45	15.38***	1,19
OCPLT	.54	PL BREAK	.30	8.42**	1,20
CPLT	.51	PL BREAK	.26	6.98*	1,20
OCSLQM	.55	PS BREAK	.30	8.73**	1,20
CLSQM	.50	PL BREAK	.25	6.51*	1,20

Note: Predictors were entered in a stepwise manner.
* $p < .05$. ** $p < .01$. *** $P < .001$.