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DEVELOPING TEAM COHESION: A QUASI-FIELD EXPERIMENT

THESIS

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AFIT/GEM/ENV/04M-07

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DEVELOPING TEAM COHESION:
A QUASI-FIELD EXPERIMENT

THESIS

Presented to the Faculty
Department of Systems and Engineering Management
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In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Engineering Management

John F. Costello

Captain, USAF

March 2004

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ABSTRACT

Within military organizations, research findings have lent support to the positive influence cohesion has on group performance in combat and non-combat areas. Beyond performance, research findings show that cohesion influences the job satisfaction, and health of military members, particularly under highly stressful conditions, such as those encountered in combat or extended deployments. The purpose of this research effort is to further analyze the strategies that should be used to develop cohesiveness among Air Force members. This was done by testing the extent to which cohesion changed when familiarization and challenging situations were coupled in a technical training course geared towards junior military officers. The findings suggest that over short periods of stressful activity, with a familiarized group, cohesion as a whole increases at an accelerated rate. Furthermore, an individual's pre-conceived bias towards group formation does not have much of an impact on the development of cohesion within the group.

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DEVELOPING TEAM COHESION: A QUASI-FIELD EXPERIMENT

There has been widespread agreement that cohesion positively affects sports teams (Eys, 2002) and industry groups (Deeter-Schmelz, 2000). Within military organizations, research findings have lent similar support to the influence cohesion has on group performance in combat and non-combat areas. In fact, a recent meta-analysis of 39 studies reinforces these conclusions, finding that cohesion positively influenced military groups' and members' performance (Oliver, Harmon, Hoover, Hayes, and Pandhi, 1999). Beyond performance, the meta-analysis indicated that cohesion appears to influence the morale, job satisfaction, and health of military members, particularly under highly stressful conditions, such as those encountered in combat or extended deployments.

Given the body of evidence that touts the positive influence cohesion has on the performance of military units, it is not surprising that military leaders encourage organizational strategies and systems that foster cohesion among their fighting units. The Air and Space Basics Course, the Air Force officer's first professional military officer training course, has a student mission statement that reads, "Become a corps of professional airmen who can articulate air and space doctrine and develop a common bond with fellow war fighters" (ASBC, 2003). Making cohesion a priority early in every officer's career demonstrates the importance the Air Force places on its development.

The United States Air Force training and deployment strategies have been designed to develop cohesive groups so that these groups will perform to their maximum when deployed and at home station. There is still some question, however, how best to develop a cohesive group. For instance, Bartone, Johnson, Eid, Brun, and Laberg (2002) suggested that training activities are often designed to let the trainees familiarize themselves with each other so that a cohesive team will develop. Other training activities use stress and challenging situations to create cohesion. Some evidence exists that these two methods should be coupled together to develop the most cohesive group (Bartone et al., 2002). The purpose of this study is to further analyze the strategies that can be used to develop cohesiveness among Air Force members; by testing the extent to which cohesion changes when familiarization and challenging situations are coupled.

Literature has shown that several variables influence the formation of group cohesion, and that cohesion influences performance. The beginnings of cohesion research and a general model illustrating these influences and outcomes will be discussed in the next section.

General Model of Cohesion

Most scholars trace the concept of cohesion back to the works of Kurt Lewin, Leon Festinger, and their colleagues at the Research Center for Group Dynamics at the Massachusetts Institute of Technology (Forsyth, 1999). As early as 1943, Lewin used the term cohesion to describe the forces that keep a group intact. Festinger, Schachter, and Back (1950), in their studies on spontaneous groups in housing developments, defined cohesion as all of the forces that act on members to remain in a group.

Based on these initial thoughts, studies have diverged slightly as researchers have attempted to isolate the antecedents that create cohesive groups. The variables that have been studied in this stream of research fall in four general areas: group characteristics, group processes, individual preferences, and environmental characteristics. The group characteristics that have been explored relate to the attributes of the members of the groups themselves that facilitate cohesion. In contrast, the group processes that have been studied refer to the ways the individuals within the group interact with one another. The extent to which group characteristics and processes influence the development of cohesion may be moderated by the characteristics of the environment and the individual. The individual preferences that have been explored pertain to the feelings of the individuals within the group towards all groups and the influence these feelings have on cohesion. Conversely, environmental characteristics refer to the specific group's surroundings and the influence they have on cohesion.

Figure 1 illustrates the common model that has guided much of the cohesion research. While it is beyond the scope of this discussion to review all of the nuances of this model, a limited number of the most common and significant findings are discussed. This discussion will begin with a review of the literature that has explored the cohesion-performance relationship. This will be followed by a discussion of the literature related to the antecedents.

Cohesion-Performance Relationship

Kurt Lewin (1943), in a study investigating the social forces behind eating habits and methods of change, is generally regarded as the first to use the term cohesion to describe the forces that bind groups together, while countering forces that worked to

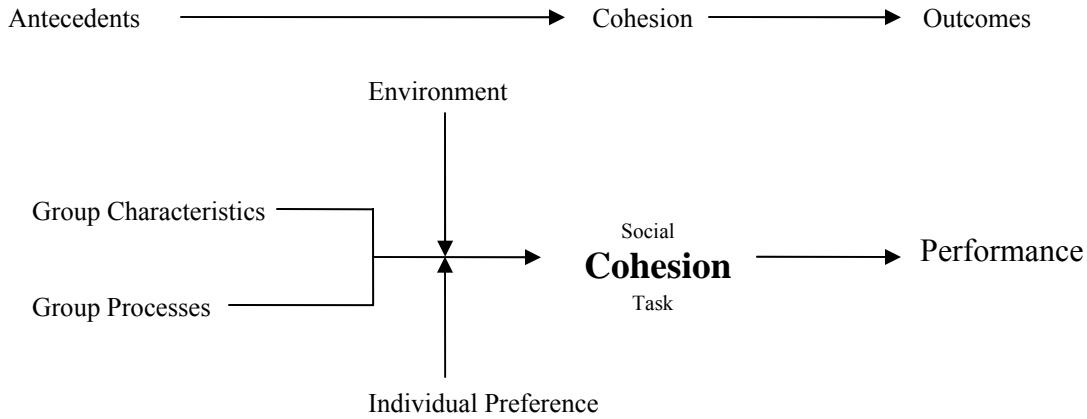


Figure 1. Common cohesion model: Influence of antecedents on cohesion and outcomes of the group.

pull them apart. Langfred (1998) defined cohesiveness as the friendship between group members or the extent to which the group members like each other. Langfred goes on to say that cohesion has no meaning outside of the group being studied. Rempel and Fisher (1997) explained cohesion as the primary motivating factor to remain in a group. Frank (1997) described it as the attractiveness of the group to its members, a sense of belonging. Forsyth (1999) likened cohesion to the glue or bond that holds group members together. The bonds tying groups together revolve around the relationships members share with the task and each other. Although cohesion has been defined as one entity in much of the traditional literature, Mullen, Anthony, Salas, and Driskell (1994), in a meta-analysis of the groupthink and cohesion research found that cohesion may have two dimensions. These are social cohesion and task cohesion which may be very different and often produced opposite effects. Carless and Depaola (2000) defined task cohesion as the extent of motivation to accomplishing the organization's goals and

objectives. Social cohesion was defined as the motivation to develop and retain social interaction within the group.

Whether cohesion is studied as one construct or divided into two, the influence it has on performance is well documented. In general, cohesion is believed to increase performance in military units, sports teams, and industry groups (Mullen & Cooper, 1994). Shils and Janowitz (1949), in the seminal work on cohesion, found that German army units with high cohesion levels resisted collapse and surrender, despite facing the toughest odds. Oliver et al. (1999) recently confirmed these findings in a meta-analysis of 39 studies and concluded that cohesion has a positive effect on performance in military units. Similar findings were suggested by Carron, Coloman, Wheeler, and Stevens (2002), in a meta-analysis of 46 studies conducted on sports teams.

There is evidence to suggest that task cohesion and social cohesion have differing effects on performance. Mullen and Cooper (1994) showed that task cohesion had a positive relationship with performance and social cohesion had no significant relationship with performance. In a related study, Mullen et al. (1994) concluded that task cohesion improved group decision quality, whereas social cohesion impaired group decision quality.

While this study focuses on task and social cohesion's effect on performance, cohesion's effect on groups has been shown to improve more than just performance. That is, cohesion has also been shown to have an effect on job satisfaction (Gal & Manning, 1987) and health (Bartone & Adler, 1999). These effects are even more significantly evident under highly stressful situations such as those found in combat (Bartone, Marlowe, Gifford, & Wright, 1992).

Antecedents

Given the role that cohesion purportedly plays in group performance, considerable efforts have tried to isolate the factors that contribute to the development of cohesive groups. Siebold (1987) identified the following factors as influencing cohesion: proximity of group members over time; social similarities or commonalities; and joint tasks or common experiences. Drawing from this theory, the work of Widmeyer, Brawley and Carron (1985), suggesting that an individual's attraction to the group increases cohesion, and the model presented in Figure 1, the constructs have been further stratified as shown in Figure 2. The constructs are described in more detail in the subsequent sections.

Group characteristics. The characteristics of a work group are found in all thorough models of effectiveness. Tannenbaum, Beard, and Salas (1992) refer to this antecedent as team characteristics, while Campion, Medsker, & Higgs (1993), Gladstein (1984), and Guzzo and Shea (1992) refer to group characteristics as group composition, and Hackman (1987) refers to this antecedent as group design. However the antecedent is put into words the characteristics of a group have been shown to influence task performance when investigated. (Campion et al., 1993).

Group heterogeneity, for instance, has been shown to have a positive effect on performance especially when the group task involves many skill sets. That is, when the task demands the use of many different skills to complete, more heterogeneous groups tend to be more cohesive and perform at higher levels (Gladstein, 1984). There is also some speculation that heterogeneity can improve performance because members can learn from each other (Campion et al., 1993). Pfeffer (1985), drawing from research

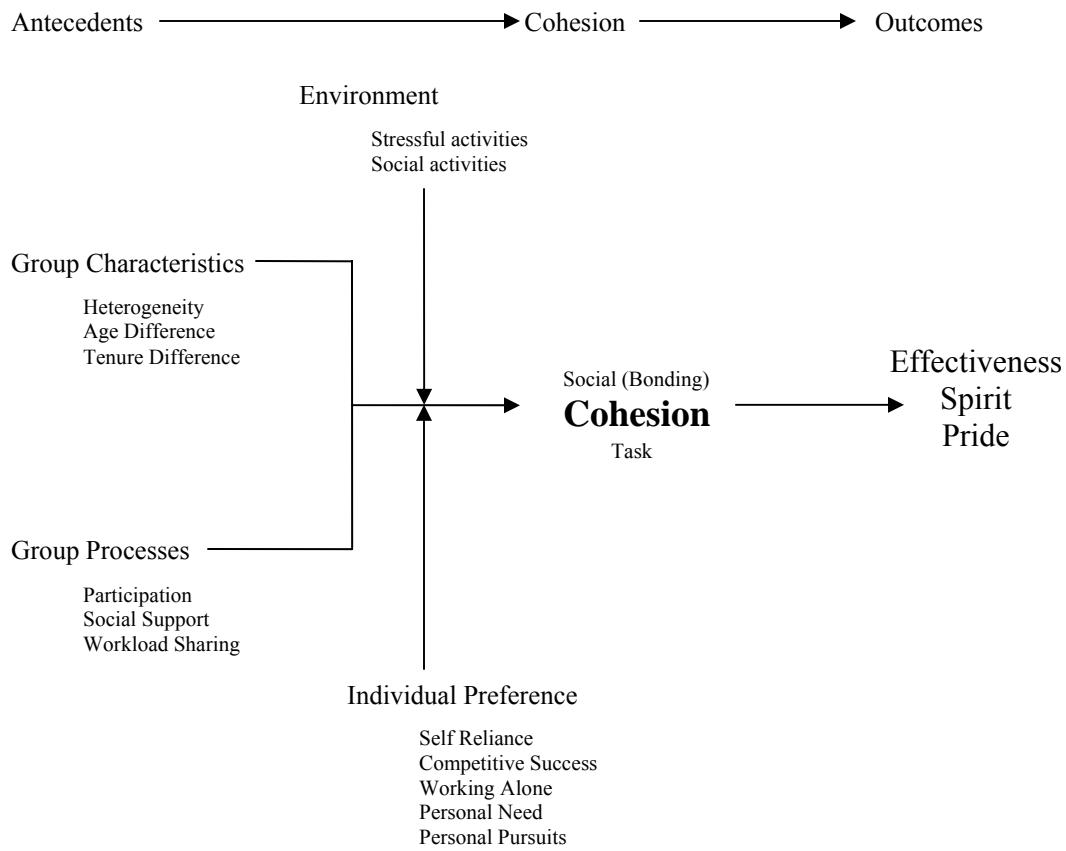


Figure 2. Flow of cohesion model: Influence of antecedents on cohesion and outcomes of the group.

conducted by Berscheid and Walster (1969), suggests that age and tenure are two of the most important factors in supporting interpersonal relations. Pfeffer also asserts that those sharing similar age and tenure are more likely to form meaningful groups.

Group Processes. Processes describe the things that go on within a group that influence cohesion and ultimately effectiveness. Gladstein (1984), Tannenbaum et al. (1992), Hackman (1987), and Guzzo and Shea (1992) used group process in their models of effectiveness. One of these processes is participation. The degree to which each member of the group is allowed to participate in decisions has an effect on that

individual's cohesiveness to the group (McGrath, 1984) where those that feel they participate more are closer to the group. Campion et al. (1993) goes on to suggest that participation enhances effectiveness by giving each group member a sense of ownership in the final outcome. Participation may also increase decision quality by putting decisions as close to the working entity as possible.

Social support plays a vital role in group processes. Gladstein (1984) describes social support as a group maintenance behavior, enhancing effectiveness by sustaining effort. Campion et al. (1993) in a study on how best to design work groups, observed that the employee data collected on social support showed very high correlations to productivity, suggesting that effectiveness is improved as group members work together and have meaningful social interaction.

Workload sharing is another group process which enhances cohesion by preventing social loafing (Albanese & Van Fleet, 1985). Campion et al. (1993), in the same study on how best to design work groups, suggests that sharing within groups can be enhanced if group members feel that their contribution to the group is important to the outcome. More specifically, Campion et al. found significant correlations between workload sharing, productivity and manager's judgment of effectiveness in financial institutions.

Individual. Researchers have hypothesized that membership in a social group provides for the basic and inherent needs of an individual. Separation from other social groups, such as family and friends, facilitate the formation of a cohesive group (Shils and Janowitz, 1948). Widmeyer et al. (1985) suggest that cohesion is influenced by the individuals within the group. The individual's social attraction to the group before they

enter the group influences the development of cohesion within the group. Widmeyer et al. also suggest that the individual attraction to the task of the group influences cohesiveness within the group. Social similarities between group members have also been shown to increase the formation of cohesion (Bartone, et al., 2002).

Environment. Proximity or spending more time together as a group results in stronger cohesive bonds. Bartone, et al. (2002), in a study involving Norwegian Naval Academy cadets, empirically showed that cohesion levels were higher in groups that had been in close proximity for long periods of time and higher still after participating in common stressful experiences. Several authors have suggested that common experiences as a group, not only commonalities of individuals, increase the formation of cohesion (Gal, 1983), Marlowe (1985), and Manning (1991). Bartone et al. suggest that the group experiences do not always have to be positive or successful to aid in the formation of cohesion.

Summary

In summary, this study looked at the way that perceptions of group characteristics, perceptions of group process, and individual preferences toward groups were related to cohesion in a particular environment. In this environment, a familiarity period was followed by a stressful period where expected cohesion to develop after each period. The following chapter outlines the procedures used in collecting data to test the proposed, flow of cohesion model (Figure 2). The development and implementation procedures of the studies questionnaire are described in detail. Alpha coefficients from each items original source are presented to describe the usefulness of the item. The sample and training course are described as well.

Method

Sample

The sample consisted of junior military officers enrolled in a technical training course that was directed towards one Air Force occupation, namely, facility engineers. The age and tenure of all participants was similar with a mean age of 26 years ($SD = 3$ years) and a mean tenure of 13 months ($SD = 16$ months). Age and tenure were reported by each participant with two open-ended items. (ie., What is your age in Years? and How long have you been in the Air Force?). In addition, academic backgrounds were similar in that all had received at least a Bachelor's degree in an engineering discipline or Architecture (i.e., this is a requirement to become a part of this Air Force specialty, termed civil engineering officer) and a small percentage, 8%, had received a master's degree. The participants in the course were similar to the entire United States Air Force officer corps with respect to gender. The participants were 88% male and 12% female, while the entire Air Force officer corps is 82% male and 18% female (USAF Almanac, 2003).

Procedures

Data were collected at three points in time. The data were collected at the beginning of the course, at the end of the familiarization or low stress period, and again at the end of the high stress or field period. Web-based surveys were used for the first two administrations to facilitate ease of collection. The final survey was conducted using pencil and paper because the training was conducted at a location with no computer access.

Regardless of the questionnaires' format, the purpose of the study was outlined for all of the participants. Specifically, a cover letter explained the study's purpose, the salience of the study, and the protections provided to participants. Most importantly, the cover letter highlighted the voluntary nature of the study and provided the participant with all of the researcher's contact information. This is provided at Appendix A.

While the data were collected anonymously, there was a need to match the data collected at the three different times. To ensure anonymity while making it possible to match data, participants were instructed to create a code for all surveys. The survey instructed each participant to enter the first two letters of his or her father's name, the first two letters of his or her mother's name, and the date on which they were born, day of the month only. By having participants code questionnaires and by specifying the nature of the code, data collected at different times were matched, without sacrificing anonymity or making the participant commit a code to memory.

Course Description

The introductory technical course conducted for young officers entering the Civil Engineer career field has two major blocks of study. The first block focuses on the engineer's role in managing an Air Force installation. The course strives to build on each student's understanding of the civil engineer's mission, organization, structure, processes, and procedures. For example, classes are taught in facility engineering, heating and cooling, management, and environmental operations. To facilitate learning, students are broken up on the first day into small groups termed, flights. They will work with the same flight members throughout the course. The second block focuses on the civil engineer's wartime functions and includes both classroom and field instruction. Classes

address the concepts behind combat runway repair, force beddown planning, expedient construction, and techniques and methods of recovery after attack. After learning the theory behind the civil engineer's wartime function, students are asked to put the theory to work with a training experience at a remote location. Each student is required to lead their flight through a contingency operation such as setting up tents, repairing a runway, or bedding down aircraft. A distinguished graduate program is in place for this course. Ten percent of the officers participating in the course receive distinguished graduate honors for their excellence in the academic and leadership portions of the course (CESS, 2003).

Because of the structure of the course, participants experience different levels of stress. The first block of study includes some tests and evaluations, but the environment was considered low stress. The second block of study includes timed activities with physical labor and competition making the environment stressful. For this study, the two blocks of study were classified as low stress or familiarization, and high stress or field portion. The classifications were verified through two open-response questions to former students: "Was the classroom portion of the training course stressful?" and "Was the field portion of the course more or less stressful or the same as the classroom portion?"

Measures

To measure how participants felt about their fellow officers in their small groups, and to determine their overall attitude towards teams, two questionnaires were developed and administered. The first consisted of 53 items and was administered to each group at the outset of the course. The second questionnaire included 61 items. This instrument was administered to each student at the end of the low stress portion of training and again

upon completion of the high stress portion. This questionnaire is presented in Appendix A. In addition, a six-item questionnaire was administered to each faculty member in charge of the small group to gain an independent assessment of each groups' effectiveness. This questionnaire is presented in Appendix B. In summary, each of the questionnaires measured perceived cohesion of the flight, the factors leading to cohesion, and group outcomes. Each variable measured, its definition, and source are provided in Table 1.

Unless otherwise noted, response options ranged from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). Additionally, participants were given a response option of 0 (*Do Not Know*) in the initial questionnaire because they had little chance to interact with their group members before the instrument was administered. In addition, many of the items were reworded so that they were more appropriate for the setting. For instance, phrases like "My team" or "My group" were replaced by "My flight" making them more appropriate for the military environment.

Characteristics of Groups

Heterogeneity. Three items taken from Campion et al. (1993) were used to measure heterogeneity. This construct represents the perceived similarities and differences of the group members. For example, the participants rate the extent to which they feel, "The members of this flight have skills and abilities that complement each other." Campion et al. reported a coefficient α of .74 for the three item scale.

Age difference. Age difference was calculated by subtracting the mean age (in years) of the sample from each person's actual age, and finding the mean of that difference. This calculation gave us the mean difference in age of all participants.

Table 1
Questionnaire Measures

<u>Constructs</u>	<u>Definition</u>	<u>Sample Item</u>	<u>Source</u>
Group Characteristics			
Heterogeneity	Perceived similarities and differences in a group	“The members of this flight have skills and abilities that complement each other.”	Campion Medsker & Higgs, (1993)
Group Processes			
Participation	Extent to which participants believed that each member of the flight participated in decision making	“My flight is designed to let everyone participate in decision making.”	Campion et al. (1993)
Social Support	Participant’s perception of how much the participants care for one another	“This Flight increases my opportunities for positive social interaction.”	Campion et al. (1993)
Workload Sharing	Participant’s perception of how a unit’s workload is distributed	“No one in this flight depends on other team members to do the work for them.”	Campion et al. (1993)
Individual Preference			
Self Reliance	Participant’s personal feeling that relying on oneself is important	“Only those who depend on themselves got ahead in life.”	Wagner (1995)
Competitive Success	Amount of importance an individual puts on success in a competitive environment	“Winning is everything”	Wagner (1995)
Working Alone	The value the participant attaches to working alone	“I prefer to work with others in a group rather than working alone.”	Wagner (1995)
Personal Need	The subordination of personal need to group interests	“People in a group should be willing to make sacrifices for the sake of the group’s well-being.”	Wagner (1995)
Personal Pursuits	Participant’s beliefs of how personal pursuits affect the group’s effectiveness or productivity	“A group is most productive when its members follow their own interests and concerns.”	Wagner (1995)

Cohesion

Task Cohesion	Participant's perceived motivation to accomplish the organization's goals and objectives	"Our flight is united in trying to succeed."	Carless & Depaola (2000)
Social Cohesion	Participant's perceived motivation to develop and retain social interaction within the group	"Our flight rarely socializes together."	Carless & Depaola (2000)
Affective Horizontal Bonding	The extent to which the participants trust and care about one another	"Officers in this flight feel very close to one another."	Carless & Depaola (2002)
Outcomes			
Affective Pride	Participant's perception of how proud the members of the flight are to be part of the flight and the Air Force	"The officers in this flight are proud to be in the Air Force."	Siebold & Kelly (1998)
Group Spirit	The confidence a participant has in his or her flight	"My flight can take on nearly any task and complete it."	Campion et al. (2001)
Individual Rated Effectiveness	Participant's perception of the groups effectiveness	"My flight was very effective during this course."	Zuhlsdorf (2002)
Supervisor Rated Effectiveness	Supervisor's perception of the groups effectiveness	"This flight adequately completes assigned duties."	Lynch, Eisenberger, & Armeli (1999)

Tenure difference. Tenure difference was calculated in the same way as age difference only it was calculated in month's difference due to the short tenure of some participants.

Group processes

Participation. The extent to which participants believed that each member of the flight participated in decision making was measured with three items taken from Campion et al. (1993), who reported a coefficient α of .88. An example item asks the

participant to rate how well, “My flight is designed to let everyone participate in decision making.”

Social support. A cohesive unit provides strong social support, positive interaction, and cares for others in the group. To measure perceptions of social support, three items were adapted from Campion et al.’s (1993) scale. Campion et al. reported a coefficient α of .78 for their scale. An example item asks, “This flight increases my opportunities for positive social interaction.”

Workload Sharing. Workload sharing was measured with three items that were taken from Campion et al. (1993) reporting a coefficient α of .84. Workload sharing reflects participant’s perception of how a unit’s workload is distributed. For example, participants are asked to respond to the statement, “no one in this flight depends on other team members to do the work for them.”

Individual preference

The 20 items from a scale designed to assess an individual’s preferences towards teams and team-based environments were also included (Wagner, 1995). These items were not specific to the course and have been designed to tap one’s general preferences. Like the other questionnaire items, the participants were given response items ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). However, the 0 (*Do Not Know*) option was removed from this section because these are personal preferences and all participants should have been able to respond, even at Time 1.

Self reliance. Self reliance reflects the participant’s personal feeling that relying on oneself is important. Self reliance was measured with five items asking things like,

“Only those who depend on themselves get ahead in life.” Wagner (1995) reported a coefficient alpha of .72 for this scale.

Competitive success. Competitive success measured the amount of importance an individual puts on success in a competitive environment. The five-item scale that was used was reported to have an α of .79 by Wagner (1995), and asked questions such as, “Winning is everything” and “Success is the most important thing in life.”

Working alone. Three items taken from Wagner (1995) measured the value an individual attaches to working alone. Wagner reported a coefficient α of .83 for the three-item scale. Two of the items were reverse coded and all asked things such as, “I prefer to work with others in a group rather than working alone.”

Personal need. A four-item scale adapted from Wagner (1995) was used to measure the subordination of personal need to group interests. All five items in this construct were reverse coded. For example, “People in a group should be willing to make sacrifices for the sake of the group’s well-being.” Wagner reported a coefficient α of .80.

Personal pursuits. Personal pursuits measures the individual’s beliefs of how personal pursuits affect the group’s effectiveness or productivity. The three-item scale was taken from Wagner (1995) who had a reported coefficient α of .76. “A group is most productive when its members follow their own interests and concerns,” is a representative item from the scale.

Cohesion

Cohesion. Two factors of cohesion were measured, namely, task cohesion and social cohesion. Each were measured with four items that have been adapted from Carless and Depaola (2000). Carless and Depaola reported a coefficient α of .74 for task

cohesion and a coefficient α of .81 for social cohesion. A task cohesion sample item was, “Our flight is united in trying to succeed.” A social cohesion sample item asks, “Our flight rarely socializes together.”

Affective horizontal bonding. Affective horizontal bonding represents the extent to which unit members trust and care about one another. Six items adapted from the combat platoon cohesion questionnaire were used to measure this construct (Siebold & Kelly, 1998). Siebold and Kelly’s original scale had a coefficient α of .86. An affective horizontal bonding sample item asked, “Officers in this flight feel very close to one another.”

Outcomes

Measures of outcomes were included in the questionnaire that was presented at the end of each stress condition. These scales were meant to measure the perceived pride, spirit, and effectiveness of the unit upon completion of the training course.

Affective pride. Affective pride taps how proud the members of the unit are to be a part of the unit and the Air Force. Five items were adapted from the combat platoon cohesion questionnaire to measure this construct (Siebold & Kelly, 1998). Siebold and Kelly’s original questionnaire had a coefficient α of .86. An example item asked, “The officers in this flight are proud to be in the Air Force.”

Group spirit. Group spirit measures the confidence a member has in his or her unit. The construct includes three items adapted from Campion et al. (2001), who reported a coefficient α of .80. An example item asked the participant to rate how well: “My flight can take on nearly any task and complete it.”

Individual rated effectiveness. The five-item effectiveness scale measured the group members' perceptions of the group's effectiveness. The items were adapted from Zuhlsdorf (2002), who reported a coefficient α of .92 for the scale. The following example problem is provided: "My flight was very effective during this course."

Supervisor rated effectiveness. Effectiveness of the unit was further assessed by trainers who observed the flight's performance. Specifically, two aspects of vertical effectiveness were measured: in-role and extra-role task performance. Two in-role task items adapted from Lynch, Eisenberger, and Armeli (1999) measure the flights' aptitude for fulfilling requirements set for them. An example item was, "This flight adequately completes assigned duties." Four extra-role task items, also taken from Lynch et al. (1999), measured the flight's willingness to work as a team and help each other. An example item was, "This flight goes out of their way to help each other." Lynch et al. did not report an estimate of internal consistency for either scale except to say that they were high.

The following chapter will show results from the data collected during the technical training course. Alpha values are presented for the pilot study confirming the usefulness of the instrument. Mean and standard deviation values are presented for each administration of the instrument. As outlined in this chapter, the instrument was administered three times to each participant; once at the beginning of the course, once at the end of the familiarization period (prior to the beginning of the field portion), and finally at the end of the course. A correlation table is presented in the following chapter to show the linear relationships between selected constructs.

Results

Pilot Study

The pilot study was conducted to ensure that the questionnaire provided the information that was intended. The pilot sample was similar to the study sample in that an earlier class of the same technical training course was used, and the age ($M = 25$ years, $SD = 2.62$), tenure ($M = 20$ months, $SD = 24.08$) and occupation of the samples were similar. The internal consistency of each scale was examined. Table 2 presents the coefficient alpha for each construct; and, as a basis of comparison, the table provides the coefficient alpha from the researchers that originally presented each scale. In sum, each scale appeared to meet one fundamental requirement—reliability.

The results generally exceeded the recommended cut-off value for an estimate of internal consistency measured with coefficient α (i.e., Nunnally [1978] recommends that alphas exceed .70). Moreover, no item sufficiently detracted from any particular scale's internal consistency to warrant its removal prior to testing the instrument in the field. However, a few items appeared problematic at specific times to merit a more detailed examination after the field data were collected. (See Appendix C for a detailed discussion of the estimates that were observed).

For instance, the three-item scale designed to tap heterogeneity showed an irregular pattern of internal consistency estimates over the pilot test administrations. That is, coefficient alpha at Time 1 was .60 and at Time 2 it was .77; unfortunately, it dropped to .54 at Time 3. No explanation was found for the sudden rise and fall of the coefficient alpha. However, if one item, “Officers like being a part of this flight,” were removed, the resulting alpha coefficients (at Time 1 α was .74; at Time 2 α was .88; and at Time 3 α

Table 2
Alpha Coefficients for Pilot Study

Construct	n	α	Time 1		Time 2		Time 3		Original Source
			n	α	n	α	n	α	
Group Characteristics									
Heterogeneity	36	.60	38	.77	38	.54		.74 ^a	
Group Processes									
Participation	35	.76	37	.86	38	.82		.90 ^a	
Social Support	36	.75	36	.74	38	.68		.64 ^a	
Workload Sharing	36	.78	38	.85	37	.68		.90 ^a	
Individual Preference									
Self Reliance	38	.67	37	.75	38	.82		.72 ^b	
Competitive Success	38	.64	38	.67	38	.77		.79 ^b	
Working Alone	38	.81	38	.91	37	.89		.83 ^b	
Personal Need	37	.86	38	.89	37	.84		.80 ^b	
Personal Pursuits	38	.85	37	.46	37	.86		.76 ^b	
Cohesion									
Task Cohesion	36	.63	37	.75	38	.71		.74 ^c	
Social Cohesion	32	.83	34	.79	35	.74		.81 ^c	
Affective Horizontal Bonding	30	.90	35	.87	38	.87		.86 ^d	

Construct	Time 1		Time 2		Time 3		Original Source
	n	α	n	α	n	α	
Outcomes							
Affective Pride	21	.64	35	.79	36	.74	.86 ^d
Group Spirit	---	---	38	.89	38	.90	.84 ^a
Individual Rated Effectiveness	---	---	38	.95	38	.94	.94 ^e

Note. Group spirit and individual rated effectiveness were not measured at Time 1

^a Campion, Medsker & Higgs, (1993).

^b Wagner (1995).

^c Carless & Depaola, (2000).

^d Siebold & Kelly, (1988).

^eZuhlsdorf, (2002).

was .74) were more consistent with the findings of Campion et al. (1993), who observed an α of .74. While the pilot study showed an improvement in alpha with one item removed, it was left in the questionnaire for the field study and was evaluated with the study sample's data.

Field Study

The field data were collected in three administrations as the methodology outlines. The Time 1 administration consisted of 99 completed responses. The Time 2 administration consisted of only 61 completed responses. This significant drop was attributed to errors in the code of the online survey (i.e., the data did not transfer to the database and was lost). Finally, the Time 3 data consisted of 89 responses. This drop in responses was predicted due to the field conditions experienced before the final administration. Some of the subjects were tired after being put in a demanding field environment where they had been challenged physically and mentally with little sleep over an entire week. Despite the fluctuation in participants, all measures appeared

internally consistent. As expected, the data did indicate that the participant's perceptions changed in a positive way over time. One notable exception revolves around the general preferences one had for group work where the means declined. Moreover, the changes were generally significant statistically. ($p < .05$)

Group Characteristics

As part of Group Characteristics, Table 3 shows the age differences, in years, of the subjects. The difference for this sample of young Civil Engineer officers was 2.69 years ($SD = 1.95$). The tenure difference, in months, of the subjects was also included as a group characteristic. A rather high mean difference of 10.38 months was reported with a standard deviation of 23.67. Prior enlisted service before entering the officer ranks and late accessions into the Civil Engineering career field may account for this high tenure difference.

Familiarity

As a whole, familiarity seemed to play a significant ($p < .05$) role in changing perceptions of group cohesion, group characteristics, and group processes. Moreover, the one measure of outcomes for Time 1 and Time 2, affective pride, showed a significant increase in mean also. This was the expected outcome for all constructs as the subjects did not know each other prior to the familiarity portion of the training. The results of these analyses are presented in Table 3.

Beginning with group processes, participation jumped over two and half points from a mean of 2.39 ($SD = 2.16$) to a mean of 5.02 ($SD = 1.15$). Social support showed a significant positive difference between the Time 1 mean of 3.48 ($SD = 1.87$) and a Time 2 mean of 5.20 ($SD = 1.17$). Moreover, workload sharing showed the greatest difference

Table 3
Descriptive Statistics

Construct	Time 1			Time 2			Time 3		
	M	SD	α	M	SD	α	M	SD	α
Group Characteristics									
Heterogeneity	3.76	1.86	.65	5.77 ^a	0.74	.62	5.96	0.84	.74
Age difference (Years)	2.69	1.95	---	---	---	---	---	---	---
Tenure Difference (months)	10.38	23.67	---	---	---	---	---	---	---
Group Processes									
Participation	2.39	2.16	.79	5.02 ^a	1.15	.80	5.33	1.06	.84
Social Support	3.48	1.87	.57	5.20 ^a	1.17	.83	5.70 ^b	0.87	.65
Workload Sharing	1.64	2.00	.96	4.63 ^a	1.23	.77	4.94	1.34	.82
Individual Preferences									
Self Reliance	5.00	0.88	.56	4.38 ^a	1.20	.83	4.48	1.05	.78
Competitive Success	4.34	1.10	.61	4.08 ^a	0.93	.66	3.97	1.06	.68
Working Alone	4.87	1.30	.81	4.73	1.20	.88	4.75	1.23	.84
Personal Need	5.82	0.76	.70	5.71	0.86	.89	5.99	0.73	.80
Personal Pursuits	5.37	1.08	.65	5.34	1.21	.88	5.11 ^b	1.14	.74
Cohesion									

Construct	Time 1			Time 2			Time 3		
	M	SD	α	M	SD	α	M	SD	α
Task Cohesion	2.60	1.81	.75	4.95 ^a	1.19	.80	5.55 ^b	0.94	.65
Social Cohesion	1.99	1.80	.87	4.25 ^a	1.29	.81	4.66 ^b	1.18	.75
Affective Horizontal Bonding	2.57	1.84	.87	5.09 ^a	1.14	.90	5.54 ^b	1.02	.88
Outcomes									
Affective Pride	2.62	2.19	.89	5.23 ^a	1.14	.86	5.70 ^b	0.93	.80
Group Spirit	---	---	---	5.16	1.21	.83	6.01 ^b	0.95	.86
Individual Rated Effectiveness	---	---	---	4.97	1.63	.96	6.06 ^b	0.94	.90

Note. Time 1 N=99, Time 2 N=61, Time 3 N=85

^aValue significantly differs from Time 1 ($p < .05$).

^bValue significantly differs from Time 2 ($p < .05$).

between the Time 1 mean of 1.64 ($SD = 2.00$) and the Time 2 mean of 4.63 ($SD = 1.23$).

Heterogeneity as the only construct in the group characteristics field that changed

between Time 1 and Time 2 showed a significant increase in the mean from 3.76 ($SD = 1.86$) to 5.77 ($SD = 0.74$) for Time 1 and Time 2, respectively.

All the dimensions of cohesion showed a significant change in means after the familiarity period. Affective horizontal bonding showed the most significant change in mean from 2.57 ($SD = 1.84$) to 5.09 ($SD = 1.14$) between Time 1 and Time 2,

respectively. The task cohesion mean increased from 2.60 ($SD = 1.81$) to 4.95 ($SD = 1.19$) from Time 1 to Time 2. Social cohesion showed the smallest, but still significant gain in mean starting at Time 1 with the mean being 1.99 ($SD = 1.80$) and rising to 4.25 ($SD = 1.14$) for Time 2.

Influence of Stress

To test the extent to which participants' perceptions changed after a stressful situation, a series of t-tests assessed the differences between perceptions at Time 2 and Time 3. Means for the Time 2 and Time 3 data were not as consistently different as they were for the Time 1 and Time 2 data. Though all three cohesion constructs again showed significant increases in mean, the antecedents only showed half of the constructs with significant increases. All of the outcome constructs showed a significant increase from Time 2 to Time 3.

Participation and workload sharing did not show significant increases in mean from Time 2 to Time 3. Both means increased slightly from Time 2 to Time 3, participation from 5.02 ($SD = 1.15$) to 5.05 ($SD = 1.16$) and workload sharing from 4.63 ($SD = 1.23$) to 4.95 ($SD = 1.41$) but neither were significant at the $p < .05$ level. Social Support was the only group process that showed a significant increase in the mean from Time 2 to Time 3. The mean at Time 2 was 5.20 ($SD = 1.17$) and at Time 3 the mean jumped to 5.70 ($SD = .88$). The mean value of heterogeneity continued to rise significantly from Time 2 to Time 3, from 5.77 ($SD = 0.74$) to 6.06 ($SD = 0.68$).

The three dimensions of cohesion rose. While the rise was not as drastic, it was significant across all dimensions. Affective horizontal bonding again showed the largest increase from a mean of 5.09 ($SD = 1.14$) at Time 2 to a mean of 5.67 ($SD = 0.94$) at

Time 3. Task cohesion showed the second largest increase from a mean of 4.95 ($SD = 1.19$) at Time 2 to a mean of 5.44 ($SD = 1.01$) at Time 3. Social Cohesion again showed the smallest increase, but it still remained significant with the mean rising from 4.25 ($SD = 1.29$) to 4.72 ($SD = 1.23$) from Time 2 to Time 3, respectively.

As cohesion changed, the measures of the outcomes changed between Time 2 to Time 3. Affective pride continued to increase. However, the increase was much smaller from a Time 2 mean of 5.23 ($SD = 1.14$) to a Time 3 mean of 5.70 ($SD = 0.90$). Group spirit showed a significant increase in the mean score from a Time 2 mean of 5.16 ($SD = 1.21$) to a Time 3 mean of 5.89 ($SD = 1.11$). Self-reported measures of group effectiveness showed the largest increase of the outcome measures, jumping from a mean of 4.97 ($SD = 1.63$) at Time 2 to a mean of 5.96 ($SD = 1.14$) at Time 3.

Individual Preference

Contrary to expected results, most of the individual preference constructs showed a decline in mean score. Because this construct measures the individuals pre-disposed preferences as they pertain to teams, the expected result would be that the mean scores stay relatively constant, or slightly rise due to training. Only two of constructs, self reliance and competitive success showed significant ($p < .05$) declines in mean score from Time 1 to Time 2. Self reliance at Time 1 had a mean score of 5.00 ($SD = 0.88$) and at Time 2 a mean score of 4.38 ($SD = 1.20$). Competitive success had a mean score of 4.34 ($SD = 1.10$) at Time 1 and a mean score of 4.08 ($SD = 0.93$) at Time 2. The rest of the constructs showed only slight declines in the mean score over the three administrations.

Testing the Model

To test the validity of the proposed model (Figure 1), correlations were calculated for the antecedents and cohesion (Table 4) and for cohesion and outcomes (Table 5). A two-tailed bivariate Pearson correlation was conducted including all data collected in the field study and Time 2 and 3 of the pilot study. The pilot study was conducted in such a way that the Time 2 and 3 data are valid to the study and was added to the correlation calculations to increase the sample size.

Table 4 shows the correlations between the antecedents and cohesion. It is interesting to note that every construct included in this calculation showed strong correlations ($p < .05$) when compared to other constructs across the same survey administration (i.e., Participation Time 1 to Social Support Time 1). Moreover, all constructs except social cohesion and heterogeneity, workload sharing and heterogeneity, and workload sharing and social support had strong correlations when comparing Time 2 and Time 3 data. The opposite was true when comparing Time 1 data to the subsequent administrations. That is, no Time 3 data showed strong correlations with Time 1 data, and social cohesion Time 2 and affective horizontal bonding Time 1 were the only constructs showing strong correlations between Time 1 and Time 2 data.

As was the case in the antecedents and cohesion table, the cohesion and outcomes correlation table (Table 5) showed that all constructs had strong correlations when compared across the same survey administration. Again, no Time 1 data correlated well with any subsequent survey administration. Although affective pride Time 2 and the cohesion constructs Time 3 did not correlate well, all other constructs showed strong

Table 4

Correlation between Antecedents and Cohesion

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Heterogeneity (Time 1)	3.76	1.86	---																				
2. Heterogeneity (Time 2)	5.77	0.74	.15	---																			
3. Heterogeneity (Time 3)	5.96	0.84	.06	.45	---																		
4. Participation (Time 1)	2.39	2.16	.64 ^a	.08	.10	---																	
5. Participation (Time 2)	5.02	1.15	.04	.69 ^a	.33 ^a	.08	---																
6. Participation (Time 3)	5.33	1.06	-.06	.24 ^b	.43 ^a	.05	.50 ^a	---															
7. Social Support (Time 1)	3.48	1.87	.73 ^a	.16	.07	.70 ^a	.21	.04	---														
8. Social Support (Time 2)	5.20	1.17	.03	.74 ^a	.35 ^a	.01	.80 ^a	.43 ^a	.21	---													
9. Social Support (Time 3)	5.70	0.87	-.12	.39 ^a	.58 ^a	.04	.51 ^a	.68 ^a	.03	.59 ^a	---												
10. Workload Sharing (Time 1)	1.64	2.00	.54 ^a	.07	.11	.77 ^a	.01	.06	.57 ^a	.04	.03	---											
11. Workload Sharing (Time 2)	4.63	1.23	-.13	.46 ^a	.12	.10	.54 ^a	.31 ^a	.09	.43 ^a	.22	.18	---										
12. Workload Sharing (Time 3)	4.94	1.34	-.13	.12	.25 ^a	.15	.48 ^a	.48 ^a	.02	.30 ^a	.46 ^a	.46 ^a	.36 ^a	---									
13. Task Cohesion (Time 1)	2.60	1.81	.66 ^a	.17	.06	.83 ^a	.10	-.02	.74 ^a	.10	.03	.78 ^a	.20	.06	---								
14. Task Cohesion (Time 2)	4.95	1.19	-.02	.66 ^a	.30 ^a	.10	.86 ^a	.48 ^a	.16	.81 ^a	.52 ^a	.06	.67 ^a	.46 ^a	.15	---							
15. Task Cohesion (Time 3)	5.55	0.94	-.09	.25 ^b	.46 ^a	.16	.47 ^a	.51 ^a	.06	.49 ^a	.67 ^a	.12	.35 ^a	.52 ^a	.16	.55 ^a	---						
16. Social Cohesion (Time 1)	1.99	1.80	.51 ^a	-.01	.05	.65 ^a	-.04	.13	.57 ^a	-.03	.09	.80 ^a	.06	-.01	.68 ^a	-.01	.07	---					
17. Social Cohesion (Time 2)	4.25	1.29	.05	.45 ^a	.10	.10	.61 ^a	.30 ^a	.19	.67 ^a	.32 ^a	.18	.45 ^a	.25 ^a	.16	.67 ^a	.35 ^a	.12	---				
18. Social Cohesion (Time 3)	4.66	1.18	-.09	.21	.33 ^a	.02	.41 ^a	.45 ^a	.02	.40 ^a	.55 ^a	.12	.26 ^a	.38 ^a	.03	.44 ^a	.60 ^a	.02	.46 ^a	---			
19. Affective Horizontal Bonding (Time 1)	2.57	1.84	.61 ^a	.12	.03	.77 ^a	.07	.04	.65 ^a	.13	.07	.78 ^a	.15	.05	.82 ^a	.14	.09	.79 ^a	.24 ^b	.00	---		
20. Affective Horizontal Bonding (Time 2)	5.09	1.14	.02	.64 ^a	.25 ^a	.10	.78 ^a	.43 ^a	.20	.82 ^a	.46 ^a	.09	.58 ^a	.37 ^a	.21	.85 ^a	.56 ^a	.02	.72 ^a	.48 ^a	.19	---	
21. Affective Horizontal Bonding (Time 3)	5.54	1.02	-.14	.31	.49 ^a	.11	.50 ^a	.59 ^a	-.01	.51 ^a	.67 ^a	.16	.30 ^a	.55 ^a	.08	.49 ^a	.68 ^a	-.03	.37 ^a	.67 ^a	.02	.54 ^a	---

Note. N ranges from 61-100, Pilot study Time 2 and 3 Included

^a. p<.01^b. p<.05

Table 5

Correlation between Cohesion and Outcomes

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Task Cohesion (Time 1)	2.82	1.89	---																
2. Task Cohesion (Time 2)	5.08	1.14	.15	---															
3. Task Cohesion (Time 3)	5.55	0.94	.16	.55 ^a	---														
4. Social Cohesion (Time 1)	3.64	1.36	.68 ^a	.11	.07	---													
5. Social Cohesion (Time 2)	4.33	1.21	.16	.59 ^a	.35 ^a	.14	---												
6. Social Cohesion (Time 3)	4.66	1.18	.03	.44 ^a	.60 ^a	.02	.46 ^a	---											
7. Affective Horizontal Bonding (Time 1)	3.03	1.81	.86 ^a	.14	.09	.65 ^a	.22	.00	---										
8. Affective Horizontal Bonding (Time 2)	5.20	1.08	.15	.87 ^a	.56 ^a	.16	.67 ^a	.48 ^a	.18	---									
9. Affective Horizontal Bonding (Time 3)	5.54	1.02	.08	.49 ^a	.68 ^a	-.03	.37 ^a	.67 ^a	.02	.54 ^a	---								
10. Affective Pride (Time 1)	2.82	1.73	.84 ^a	.09	.04	.59 ^a	.11	.01	.84 ^a	.08	-.01	---							
11. Affective Pride (Time 2)	5.32	1.08	.20	.71 ^a	.30 ^a	.10	.47 ^a	.15	.17	.75 ^a	.28	.11	---						
12. Affective Pride (Time 3)	5.70	0.93	.13	.50 ^a	.60 ^a	.03	.30 ^a	.34 ^a	.13	.46 ^a	.48 ^a	.12	.66 ^a	---					
13. Group Spirit (Time 2)	5.16	1.21	.12	.91 ^a	.49 ^a	.10	.67 ^a	.42 ^a	.10	.93 ^a	.47 ^a	.04	.76 ^a	.62 ^a	---				
14. Group Spirit (Time 3)	6.01	0.95	.00	.59 ^a	.70 ^a	.01	.30 ^a	.40 ^a	.04	.58 ^a	.51 ^a	-.07	.56 ^a	.70 ^a	.65 ^a	---			
15. Individual Rated Effectiveness (Time 2)	5.15	1.46	.20	.92 ^a	.59 ^a	.19	.64 ^a	.47 ^a	.22	.85 ^a	.50 ^a	.15	.65 ^a	.45 ^a	.91 ^a	.51 ^a	---		
16. Individual Rated Effectiveness (Time 3)	6.06	0.94	-.05	.60 ^a	.75 ^a	-.04	.29 ^a	.47 ^a	-.04	.57 ^a	.62 ^a	-.12	.49 ^a	.62 ^a	.57 ^a	.80 ^a	.60 ^a	---	
17. Supervisor Rated Effectiveness (Time 3)	5.97	0.50	.05	.16	-.01	.03	.10	.05	.10	.19	.11	.15	.20	.14	.16	.11	.19 ^b	---	

Note. N ranges from 61-127, Pilot study Time 2 and Time 3 Included

^a p<.01^b p<.05

correlations between Time 2 and Time 3. Finally, supervisor rated effectiveness did not correlate well with any other construct included in this calculation.

Summary

The pilot study instrument proved to meet the fundamental requirements of reliability. While one item appeared to be somewhat problematic, it was included in the field study survey. Tables 3, 4 and 5 show the descriptive statistics and correlations for the field study data. It is clearly shown that cohesion does develop during the familiarization period and during the stressful period. It is also clear that this cohesion is connected to the antecedents and outcomes of the group.

Discussion

This study identified many factors that influence the formation of cohesion in groups; these factors included group characteristics, group processes, individual preferences, and the environment. The environment in which the training took place was the main focus of this study. More specifically, the classroom and field environments in which the training took place influenced cohesion. While the familiarization period for the group was six weeks, the stressful period was only one week. The study suggests that over short periods of stressful activity, with a familiarized group, cohesion as a whole increases at an accelerated rate. Cohesion increased during the familiarization period of the course, and continued to increase at a slightly higher rate during the stressful period for all measures of cohesion. This is shown in Figure 2. Task cohesion showed the greatest rate increase from the familiarization period to the stressful period and social cohesion showed the least rate of increase. This reinforces the theory proposed by Mullen et al. (1994), that social and task cohesion are different. It also stands to reason that social cohesion would develop more strongly during the familiarization period of the study as the participants had more time to socialize and fewer tasks to complete. On the other hand, task cohesion would develop more quickly under stressful conditions when task completion was the main focus of every day.

While the two antecedents, group characteristics and group processes, increased over time, individual preference, which measured each participant's general feelings towards teams, decreased over time. That is, the participant's general feelings towards teams showed a negative trend while cohesion continued to rise.

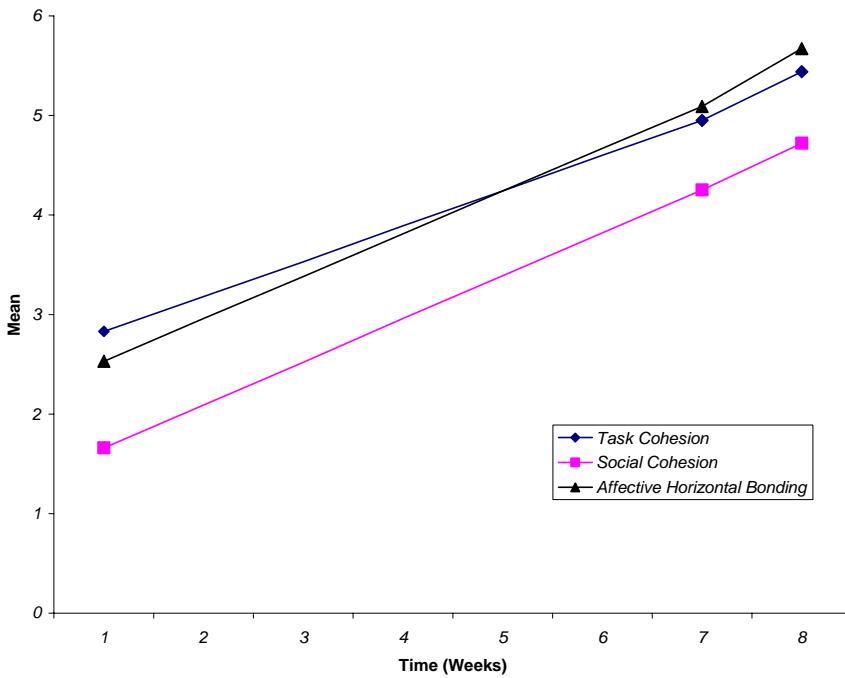


Figure 3. Growth of cohesion over time for seven week familiarity period and one week stressful period.

This suggests that cohesion may not depend on the participant's individual preference for teams as was suggested by Widmeyer et al. (1985). Instead, the keys to a cohesive unit are the environment the group is formed in, the processes involved within the group, and the characteristics making up the group.

Implications

Although the findings of this study came from a small and distinct military population, several implications can be drawn on the most effective way to build cohesion. Developing a level of familiarity was shown to increase cohesion, so was participating in a stressful activity. Furthermore, it was suggested that putting a

familiarity period before a stressful activity may create even tighter cohesive bonds among the members of the group.

Ideally, the Air Force is deploying units as a familiarized group, a group of personnel that have worked together at home station deploy together; this research supports this thinking and suggests that cohesion will increase further as the group encounters the stresses of deployment and combat. Increasingly, Air Force personnel are put together from many bases and diverse locations to deploy together. Given little time for familiarization, this study suggests, given the increased rate of cohesion growth, that the unit will still form cohesive bonds during the stressful deployment; but this study did not include groups with no familiarization before the stressful environment, so it is tough to draw conclusions as to the added benefits of familiarization before the stressful situations.

Beyond the environment, the study suggests that the procedures and make-up of the group play a role in the development of both social and task cohesion. Both group characteristics and group processes showed strong correlations to both social and task cohesion. This suggests that, while developing a cohesive unit, it is important that Air Force leaders develop diverse units with personnel that will complement each others' strengths, and provide leadership that lets all personnel participate in a share of the work. The personal feelings of the personnel towards teams in general were shown not to have as much impact as previously thought. In the context of forming cohesive groups, Air Force leaders should not concern themselves with the personal feelings of the personnel. This may have implications on other aspects of the unit so this factor should not be thrown out all together.

Limitations

There are several limitations to this study. One is that only one group was used for the study. This one group consisted of several flights that all performed the same tasks and exercises grouped into a familiarization period followed by a stressful period. No control group was present.

The number of participants in the study was another limitation. Each training class consisted of approximately 50 people, all United States Air Force officers, and only two training classes could be used due to time constraints. We did not have the ideal number of responses for statistical analysis because not all students in the training course were willing participants in all three phases of the study.,

A third limitation was the training scenario itself. The familiarization period in the technical training course was not completely void of stress, homework, tests and a distinguished graduate program made the course stressful for some officers. Furthermore, the stressful period was not completely void of familiarization time, the officers had down time in the evenings to relax stress free and socialize. The training course used presented the best possible combination of the two conditions.

Future Research

Future research into this topic can consist of more diverse groups and more diverse training scenarios. It would be interesting to study the formation of cohesion in a group put directly into a stressful situation with no prior familiarization period; this is the situation in which many of the Air Force deployed units find themselves. Likewise, it would be interesting to study the formation of cohesion in a group that only participated in a familiarization period with no known future stressful situation. Moreover, a study

consisting of several combinations of stress before familiarization, or familiarization before stress followed by more familiarization, would present interesting findings as to the best way to develop cohesion. Finally, as the training course described in this study was just a training course, it is impossible to generalize these findings to the battle field or even the work place. It would be interesting to conduct this study in a real-world situation either with a fighting unit in combat or a working group in a decision process. Any of these situations can build upon the present study and add to the current body of knowledge.

Summary

This study tested one possible training scenario involving a familiarization period followed by a stressful period to observe the increase in cohesion levels of the participants. It has been shown that cohesion positively influences performance, job satisfaction, and even health of military members (Oliver et al., 1999). This study confirmed these findings as well as researched qualifications for forming cohesive units. The group characteristics, group processes, and individual preferences of the training groups were measured to better understand how cohesion is formed in a unit. All but individual preferences were shown to influence cohesion. Moreover, this study showed that cohesion forms at an accelerated rate during periods of high stress.

Appendix A: Unit Cohesion Survey

A Study of Forming Unit Cohesion

There has been widespread support for the positive effects group cohesion has in sports teams and industry groups. Within military organizations, research findings have lent similar support to the influence cohesion has on group performance in combat and non-combat areas. In addition to increased performance there is evidence that cohesion influences the morale, job satisfaction, and health of military members, particularly under highly stressful conditions, such as those encountered in combat or extended deployments.

Considering the body of evidence that touts the positive influence cohesion has on the performance and well being of military units, it is not surprising that military leaders question organizational strategies and systems that fail to foster cohesion among their fighting units. With this in mind, the United States Air Force training and deployment strategies have been designed to develop cohesive groups so these groups will perform to their maximum when deployed.

However, there is still some question as to how to best develop a cohesive group. This research will test alternative approaches to developing cohesion in an effort to better understand the strategies that should be used to develop cohesiveness among Air Force members.

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The following information is provided as required by the Privacy Act of 1974:

Purpose: To obtain information regarding the development of Unit Cohesion

Routine Use: The survey results will be used to provide developmental feedback for Training programs within the Air Force. A final report will be provided to participating organizations. No analysis of individual responses will be conducted and only members of the Air Force Institute of Technology research team will be permitted access to the raw data.

Participation: Participation is VOLUNTARY. No adverse action will be taken against any member who does not participate in this survey or who does not complete any part of the survey.

IDENTIFICATION CODE

As part of this study, we will need to match your responses to surveys that you will complete in the next few weeks or months. One way to do this is to ask for your name, social security number or some other identifying characteristic that we could track over time. Doing this, however, would spoil the anonymity promised you.

To facilitate our need to match information while maintaining your anonymity, we want you to create a code name. We'll tell you how to create it, so you won't have to commit it to memory.

Your code should be the first two letters of your father's first name followed by the first two letters of your mother's first name followed by the day of the month you were born.

For example: If your father's first name is **Jim** your mother's first name is **Carole**, and your birthday falls on the **20th** of June, then your code would be **JICA20**. Please write your code name in the spaces provided below.

First two letters of Father's first name	First two letters of Mother's first name	Birth Day (do not include the month or year)
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Section I
ATTITUDES TOWARD YOUR FLIGHT

We would like to understand how you feel about your the fellow officers and your MGT 101 Flight. The following questions will help us do that. For each statement, please fill in the circle for the number that indicates the extent to which you agree the statement is true. Use the scale below for your responses.

① Do Not Know	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree	
1. In this flight the members really care about what happens to each other.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
2. Our flight is united in trying to succeed.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
3. My flight was very effective during this course.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
4. All in all, this flight is very competent.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
5. If members of this flight have problems or concerns, everyone wants to help them so we can get back together again.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
6. Our flight rarely socializes together.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
7. Officers in this flight feel the Air Force has an important job to do in defending the United States.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
8. The members of this flight have a variety of backgrounds and experiences.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
9. Officers like being a part of this flight.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
10. The officers in this flight feel they play an important part in accomplishing the Air Force's mission.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
11. My flight is designed to let everyone participate in decision making.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
12. Officers in this flight like one another.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
13. This flight's overall level of effectiveness is very high.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
14. Members of our flight stick together outside of class time.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
15. No one in this flight depends on other team members to do the work for them.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
16. This flight increases my opportunities for positive social interaction.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
17. Our flight would like to spend time together outside of class hours.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦
18. Officers in this flight have great confidence that the team can perform effectively.	<input type="radio"/> ①	<input type="radio"/> ②	<input type="radio"/> ③	<input type="radio"/> ④	<input type="radio"/> ⑤	<input type="radio"/> ⑥	<input type="radio"/> ⑦

① Do Not Know	② Strongly Disagree	③ Disagree	④ Slightly Disagree	⑤ Neither Agree nor Disagree	⑥ Slightly Agree	⑦ Agree	⑧ Strongly Agree
19. In my estimation, this flight gets work done effectively.	①	②	③	④	⑤	⑥	⑦
20. Officers in this flight feel the Air Force's wartime mission.	①	②	③	④	⑤	⑥	⑦
21. Officers in this flight feel very close to each other.	①	②	③	④	⑤	⑥	⑦
22. The officers in this flight are proud to be in the Air Force.	①	②	③	④	⑤	⑥	⑦
23. This flight has lots of team spirit.	①	②	③	④	⑤	⑥	⑦
24. I'm happy with my flight's level of commitment to the tasks assigned to us.	①	②	③	④	⑤	⑥	⑦
25. Members of this flight would rather go out on their own than get together as a team.	①	②	③	④	⑤	⑥	⑦
26. Officers in this flight really respect one another.	①	②	③	④	⑤	⑥	⑦
27. This flight can take on nearly any task and complete it.	①	②	③	④	⑤	⑥	⑦
28. Officers here are proud to be in this flight.	①	②	③	④	⑤	⑥	⑦
29. Nearly all the members in this flight contribute equally to the work.	①	②	③	④	⑤	⑥	⑦
30. Compared to other groups I have been associated with, the effectiveness of this flight is excellent.	①	②	③	④	⑤	⑥	⑦
31. The flight concept provides me opportunities to improve my personal performance.	①	②	③	④	⑤	⑥	⑦
32. I am going to miss the members of this flight when this class ends.	①	②	③	④	⑤	⑥	⑦
33. Being in this flight gives me the opportunity to work in a team and provide support to other team members.	①	②	③	④	⑤	⑥	⑦
34. Officers here can trust one another.	①	②	③	④	⑤	⑥	⑦
35. Our flight members have conflicting aspirations for the team's performance.	①	②	③	④	⑤	⑥	⑦
36. Officers in my flight help each other out during tasks as needed.	①	②	③	④	⑤	⑥	⑦
37. Everyone in my flight does their fair share of the work.	①	②	③	④	⑤	⑥	⑦
38. Most of the members of this flight get a chance to participate in decision making.	①	②	③	④	⑤	⑥	⑦
39. Officers in this flight vary widely in their areas of expertise.	①	②	③	④	⑤	⑥	⑦
40. The members of this flight have skills and abilities that complement each other.	①	②	③	④	⑤	⑥	⑦
41. As a member of this flight, I have a real say in how the team carries out its work.	①	②	③	④	⑤	⑥	⑦

Section II
GENERAL ATTITUDES TOWARDS TEAMS

We would like to understand how you *GENERALLY FEEL* about teams and working in groups. The following questions will help us do that. For each statement, please fill in the circle for the number that indicates the extent to which you agree the statement is true. Use the scale below for your responses.

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
42. Only those who depend on themselves get ahead in life. <input type="radio"/>						
43. To be superior, a person must stand alone. <input type="radio"/>						
44. If you want something done right, you must do it yourself. <input type="radio"/>						
45. People in a group should be willing to make sacrifices for the sake of the group's well-being. <input type="radio"/>						
46. Given the choice, I would rather do a job where I can work alone rather than doing a job where I have to work with others in a group. <input type="radio"/>						
47. Winning is everything. <input type="radio"/>						
48. I feel that winning is important in both work and games. <input type="radio"/>						
49. Success is the most important thing in life. <input type="radio"/>						
50. It annoys me when other people perform better than I do. <input type="radio"/>						
51. Doing your best is not enough; it is important to win. <input type="radio"/>						
52. I prefer to work with others in a group rather than working alone. <input type="radio"/>						
53. People in a group should realize that they sometimes are going to have to make sacrifices for the sake of the group as a whole. <input type="radio"/>						
54. Working with a group is better than working alone. <input type="radio"/>						
55. People should be made aware that if they are going to be part of a group then they are sometimes going to have to do things they do not want to do. <input type="radio"/>						
56. People who belong to a group should realize that they are not always going to get what they personally want. <input type="radio"/>						
57. A group is most efficient when its members do what they think is best rather than doing what the group wants them to do. <input type="radio"/>						
58. What happens to me is my own doing. <input type="radio"/>						

① Strongly Disagree	② Disagree	③ Slightly Disagree	④ Neither Agree nor Disagree	⑤ Slightly Agree	⑥ Agree	⑦ Strongly Agree
59. A group is most productive when its members do what they think is best rather than doing what the group wants to do.	①	②	③	④	⑤	⑥
60. In the long run the only person you can count on is yourself.	①	②	③	④	⑤	⑥
61. A group is most productive when its members follow their own interests and concerns.	①	②	③	④	⑤	⑥

Section III

BACKGROUND INFORMATION

This section contains items regarding your personal characteristics. These items are very important for statistical purposes. Respond to each item by WRITING IN THE INFORMATION requested or CHECKING THE BOX that best describes you.

1. Your Mgt 101 Flight: _____
2. Your Current AFSC: _____
4. How long have you been in the Air Force? _____ years _____ months
5. Please indicate the highest level of education that you have attained.

**Some High School
High School Diploma
Associate's degree
Bachelor's degree**

**Master's degree
Doctorate degree
Other (please specify)**

6. What is your age? _____ years

7. What is your gender?

Male

Female

END OF QUESTIONNAIRE

THANK YOU FOR PARTICIPATING

Appendix B: Supervisor Unit Cohesion Survey

A Study of Forming Unit Cohesion

There has been widespread support for the positive effects group cohesion has in sports teams and industry groups. Within military organizations, research findings have lent similar support to the influence cohesion has on group performance in combat and non-combat areas. In addition to increased performance there is evidence that cohesion influences the morale, job satisfaction, and health of military members, particularly under highly stressful conditions, such as those encountered in combat or extended deployments.

Considering the body of evidence that touts the positive influence cohesion has on the performance and well being of military units, it is not surprising that military leaders question organizational strategies and systems that fail to foster cohesion among their fighting units. With this in mind, the United States Air Force training and deployment strategies have been designed to develop cohesive groups so these groups will perform to their maximum when deployed.

However, there is still some question as to how to best develop a cohesive group. This research will test alternative approaches to developing cohesion in an effort to better understand the strategies that should be used to develop cohesiveness among Air Force members.

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Participation: Participation is VOLUNTARY. No adverse action will be taken against any member who does not participate in this survey or who does not complete any part of the survey.

INSTRUCTIONS

- Base your answers on your own thoughts & experiences
- Please print your answers clearly when asked to write in a response or when providing comments
- Make dark marks when asked to use specific response options (feel free to use an ink pen)
- Avoid stray marks and if you make corrections erase marks completely or clearly indicate the errant response if you use an ink pen

MARKING EXAMPLES

Right



Wrong



FLIGHT Observed_____

Section I **FLIGHT PERFORMANCE**

These Statements are all about the CIVIL ENGINEERING officers and the environment in the MGT 101 flight that you are observing. Use the scale printed below to select your response to each statement.

① Do Not Know	② Strongly Disagree	③ Disagree	④ Slightly Disagree	⑤ Neither Agree nor Disagree	⑥ Slightly Agree	⑦ Agree	⑧ Strongly Agree
1. This flight adequately completes assigned duties.	①	②	③	④	⑤	⑥	⑦
2. This flight meets performance requirements of the MGT 101 course.	①	②	③	④	⑤	⑥	⑦
3. The members of this flight encourages others to try new and more effective ways of completing tasks.	①	②	③	④	⑤	⑥	⑦
4. This flight continues to look for new ways to improve the effectiveness of their work.	①	②	③	④	⑤	⑥	⑦
5. This flight goes out of their way to help each other.	①	②	③	④	⑤	⑥	⑦
6. This flight volunteers for things that are not required.	①	②	③	④	⑤	⑥	⑦

Flight Observed _____

THANK YOU FOR YOUR PARTICIPATION

Appendix C: Pilot Study Coefficient Alpha Descriptions

Group characteristics. Heterogeneity showed a jump in alpha between Time 1 ($\alpha = .60$) and Time 2 ($\alpha = .77$), unfortunately this jump was reversed between Time 2 and Time 3 ($\alpha = .54$). No explanation could be given for the sudden rise and fall of the coefficient alpha. However, if one item, “Officers like being a part of this flight,” was removed the resulting alpha coefficients at Time 1 ($\alpha = .74$), Time 2 ($\alpha = .88$), and Time 3 ($\alpha = .74$) were more consistent with the findings of Campion et al. (1993), who observed an α of .74. While the pilot study shows an improvement in alpha with the one item removed, it was left in the questionnaire for the field study, and was evaluated with the study sample’s data.

Group processes. All the measures of group process demonstrated acceptable levels of internal consistency and no items appeared to be problematic in this sample. The coefficient alphas for the participation variable, for instance, were relatively stable across all three administrations. That is, the coefficient alphas were .76, .86, and .82 for Time 1, Time 2, and Time 3, respectively. These values were consistent with the $\alpha = .90$ value reported by Campion et al. (1993). Workload sharing demonstrated similar results. At Time 1, α was .78; at Time 2, α was .85; and, at Time 3, α was .68. These findings were slightly lower but consistent with the values reported by Campion et al. (i.e., $\alpha = .90$). In contrast to the first two measures of group process, estimates of internal consistency exceeded those reported by Campion et al. for the social support scale. Campion et al. reported $\alpha = .64$ while the coefficient alphas were $\alpha = .75$ at Time 1, $\alpha = .74$ at Time 2, and $\alpha = .68$ at Time 3 for the pilot test.

Individual preference. All the measures of individual preference showed sufficient levels of internal consistency. Self reliance showed a continually growing coefficient alpha starting with a value of .67 for Time 1. Coefficient alphas rose to .75 and .82 at Time 2 and Time 3, respectively. Competitive success mirrored this trend with coefficient alpha values of .64, .67, .77 for Time 1, Time 2, and Time 3, respectively. Working alone and espousal of norms showed high alpha values over the three administrations as well. At Time 1, the coefficient alpha was .81; at Time 2, it was .91; and, at Time 3, it was .89. Espousal of norms showed equally strong reliability estimates. The coefficient alpha was .86 at Time 1, .89 at Time 2, and .84 at Time 3. Personal pursuits had a problematic item, “A group is most productive when its members follow their own interests and concerns.” With this item included, the Time 1 alpha of .85 and the Time 3 alpha of .86 were strong but the Time 2 value of .46 was very low. When the problematic item was removed, the alpha values stabilized. The Time 1 and Time 2 alpha values remain strong at .89 and .84, and the Time 3 alpha value moved well into the acceptable range at .75. While the removal of the item showed improvement in the reliability, it was not removed for the field study, but was noted so as to be monitored closely.

Cohesion. Three dimensions of cohesion were measured. Task cohesion had a relatively low coefficient alpha at Time 1 of .65. At Time 2 and Time 3, the values improved to .75 and .71, respectively. These estimates were consistent with Carless and Depaola’s (2000) estimate of .74. Social cohesion had coefficient alphas that exceeded cutoff values and hovered around the value reported by Carless and Depaola ($\alpha = .81$). For this sample, coefficient alpha was .83 at Time 1, .79 at Time 2, and .74 at Time 3.

Finally, alpha coefficients for affective horizontal bonding exceeded those reports by the researchers who developed the scale (Siebold & Kelly, 1988). At Time 1, coefficient alpha was .90; at Time 2 and Time 3, coefficient alphas were identical, $\alpha = .87$.

Outcomes. Three perceived outcomes were measured, affective pride was measured at Time 1, Time 2, and Time 3, group spirit and individual rated effectiveness were only measured at Time 2 and Time 3. The estimates of reliability for affective pride were below the value reported by Siebold and Kelly (1988, i.e., $\alpha = .86$), but still exceeded the standards. At Time 1, the coefficient alpha was .64. The coefficient alpha was higher at Time 2 and Time 3 where the values were .79 and .75 for Time 2 and Time 3, respectively. The final two constructs of the outcomes antecedent were only measured at Time 2 and Time 3. The alpha coefficient for both constructs at both times either exceeded or equaled the originally documented alpha. Group spirit taken from Campion et al. (1993) with a reported alpha of .84 showed alpha coefficients at Time 2 of .89 and at Time 3 of .90. The estimate of reliability for effectiveness was almost exactly the same as the originally documented source where alpha was .94. Our data showed alphas of .95 and .94 for Time 2 and Time 3, respectively.

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<p>14. ABSTRACT Within military organizations, research findings have lent support to the positive influence cohesion has on group performance in combat and non-combat areas. Beyond performance, research findings show that cohesion influences the job satisfaction, and health of military members, particularly under highly stressful conditions, such as those encountered in combat or extended deployments. The purpose of this research effort is to further analyze the strategies that should be used to develop cohesiveness among Air Force members. This was done by testing the extent to which cohesion changed when familiarization and challenging situations were coupled in a technical training course geared towards junior military officers. The findings suggest that over short periods of stressful activity, with a familiarized group, cohesion as a whole increases at an accelerated rate. Furthermore, an individual's pre-conceived bias towards group formation does not have much of an impact on the development of cohesion within the group.</p>					
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