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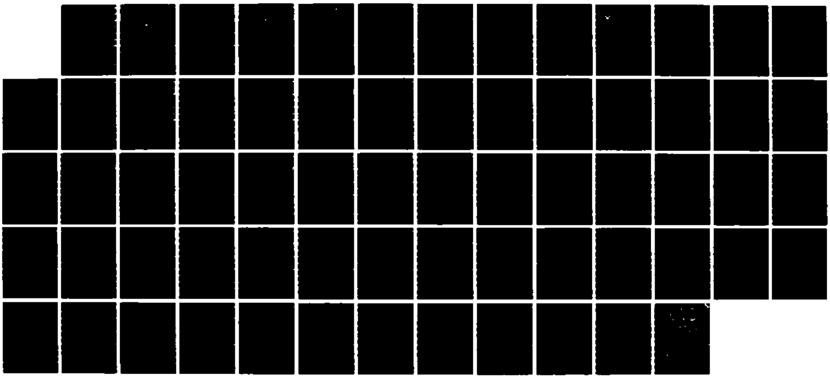

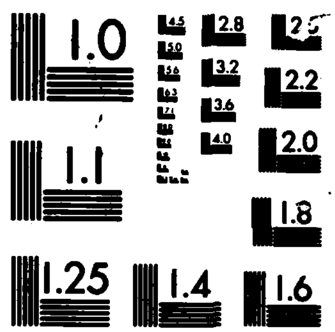

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STUDENT REPORT

AN INVESTIGATION OF THE COMBAT ATTITUDES OF AIR FORCE CIVIL ENGINEERS

MAJOR ROBERT L. PETERS 86-1995

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TITLE AN INVESTIGATION OF THE COMBAT ATTITUDES OF AIR FORCE CIVIL ENGINEERS

AUTHOR(S) MAJOR ROBERT L. PETERS, USAF

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Submitted to the faculty in partial fulfillment of requirements for graduation.

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This research examines the psychosocial dimensions of combat effectiveness, or the "will to fight," as perceived by Air Force civil engineers. Four attitudinal variables which researchers have found to contribute to combat effectiveness--morale, cohesion, combat motivation, and leadership--are investigated. The Potential for Combat Effectiveness Model developed by the Leadership and Management Development Center (LMDC) ~~at Maxwell AFB, Alabama,~~ forms the basis of this research. Data collected by LMDC between January 1982 and May 1985 are analyzed through statistical t-tests to determine attitudinal differences between civil engineering and two comparison groups, one representing base support units excluding civil engineering and the other representing the Air Force as a whole. The study finds the means for all attitudinal variables significantly higher for civil engineering than the base support group and predominantly positive in comparison to the Air Force average.

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PREFACE

The strength of a combat unit often lies in the attitudes of its members, or its "will to fight." Since 1978, Air Force civil engineering has concentrated on a program to enhance its wartime capabilities through organizing, training, and equipping teams to perform wartime tasks. While most program results are easily quantifiable, an assessment of unit attitudes leading to combat effectiveness is far more difficult to pin down. The present research attempts to provide some insight into the psychosocial dimensions of the potential for combat effectiveness, or the "will to fight," as perceived by Air Force civil engineers. Four attitudinal concepts which researchers have found to contribute to combat effectiveness--morale, cohesion, combat motivation, and leadership--are investigated in this report. In examining these concepts, the study focuses on the Potential for Combat Effectiveness Model and its related attitude measurement instrument, the Combat Attitude Survey, both developed by the Leadership and Management Development Center (LMDC) at Maxwell AFB, Alabama.

The present manuscript is written in the style of the American Psychological Association, in keeping with the requirements of LMDC. The author acknowledges a great debt to the personnel of LMDC/AN for technical advice in the preparation of this manuscript and for performing statistical tests. The help of Major Mickey R. Dansby and Captain Richard H. Brown was invaluable in this regard. Although the mission of LMDC/AN will be phased out in 1986, the data base used in this research will be transferred to the Air Force Human Resources Laboratory, AFHRL/MO, Brooks AFB, Texas 78235, Autovon 240-3256.

ABOUT THE AUTHOR

Major Robert L. Peters is a career civil engineering officer. He graduated from the United States Air Force Academy with a Bachelor of Science degree in Civil Engineering in 1971 and obtained a Master of Science degree in Engineering Management from the Air Force Institute of Technology (AFIT) in 1982. While at AFIT, his master's thesis focused on job satisfaction in base civil engineering as measured by the Hackman and Oldham Job Diagnostic Survey. Major Peters has served in a variety of positions in base level civil engineering at Wright-Patterson AFB, Ohio; Charleston AFB, South Carolina; Shu Lin Kou AS, Taiwan; and Howard AFB, Panama. He was also assigned to Headquarters, Military Airlift Command as MAJCOM Environmental Engineer and as Executive Officer to the DCS/Engineering and Services. Major Peters attended Squadron Officer School in residence in 1977 and graduated from Air Command and Staff College, class of 1986. Major Peters is a registered professional engineer in Illinois and a member of the Society of American Military Engineers and the American Society of Civil Engineers.

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AUTHOR(S) MAJOR ROBERT L. PETERS, USAF

TITLE AN INVESTIGATION OF THE COMBAT ATTITUDES OF AIR FORCE CIVIL ENGINEERS

I. <u>Purpose:</u> To investigate the psychosocial dimensions of combat effectiveness as perceived by Air Force civil engineering personnel.

II. <u>Background:</u> Since 1978, civil engineering has conducted a steady program to enhance its capability to support the Air Force mission in time of war. This program has stressed organizing, training, equipping, and exercising mobile teams to perform wartime responsibilities. The success of this program is visible in the increased quantity of equipment and trained personnel ready to deploy. However, researchers into the psychology of warfare have found that combat success often depends on more than numbers. This study attempts to supplement currently available objective data by evaluating the psychosocial dimensions of potential combat effectivenes as perceived by civil engineering personnel.

III. <u>Procedure:</u> In 1982, the Leadership and Management Development Center (LMDC) at Maxwell AFB, Alabama, brought together the results of past research and developed the Combat Attitude Survey (CAS). The CAS and a companion attitudinal measurement instrument, the Organizational Assessment Package (OAP), are designed to measure individual perceptions of morale, unit

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cohesion, combat motivation, and leadership. The OAP provides most of the general organizational measures which pertain to leadership and the factors of job satisfaction, organizational climate, and pride. Previous research had identified the four major concepts of morale, unit cohesion, combat motivation, and leadership as being leading contributors to a war-winning will to fight. Using these concepts, LMDC formed the Potential for Combat Effectiveness Model. Theoretically, the model's components combine to produce an overall measure of potential combat effectiveness. Between January 1982 and May 1985, LMDC administered the CAS and the OAP to 54,779 military members, including 3,147 civil engineering personnel. Data were collected from installations both in CONUS and overseas. Using this data base, this study statistically compares civil engineering CAS-OAP responses to those of two comparison groups, one representing the overall Air Force data base and the other representing other base support organizations, excluding base civil engineering. Results were analyzed using two-tailed *t*-tests to discern significant attitudinal differences between the groups.

IV. Results: Overall, the results of the statistical analyses predominantly favored civil engineering. In comparison to other base support organizations, civil engineering personnel showed higher values on all twelve Combat Effectiveness Model component and sub-component measures, including the overall Potential for Combat Effectiveness measure. On the other hand, results were mixed, but predominantly positive, in the comparison of civil engineering to the Air Force data base. The only measure that was significanltly lower for civil engineering was that of one of the model's sub-component measures, Combat Mental Set. The Combat Mental Set measure relates the amount of confidence personnel have in their combat abilities. Although the study results show civil engineers have less confidence than average Air Force members, they have significantly more confidence in their combat abilities than fellow support personnel.

V. Conclusions: Civil engineering fared well in this study of combat attitudes, but assessing the value of these results depends upon the validity of the Potential for Combat Effectiveness Model in predicting some measure of combat success. Needless to say, there are many other variables which enter that formula. In addition, research on the model leaves a couple of important questions unanswered, such as what score must a potentially successful combat unit achieve, and is it possible for any unit or personnel group to achieve a high score regardless of its role in the Air Force mission? One of the major researchers who contributed to the development of the model suggested personnel in combat-oriented units would respond differently from those normally involved in support. Considering that civil

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engineering normally performs a support role, it was interesting to see how well it scored relative to other support units. While this study was not specifically designed to test the effects of civil engineering's training and continued emphasis on its wartime role over the last seven to eight years, the results generally support the position that this emphasis has, indeed, contributed to enhancing the combat attitudes of civil engineers.

VI. Recommendations: This study identified no specific weaknesses in civil engineering attitudes which require immediate attention. It also found little substantive data with which to make meaningful comparisons. Therefore, the author recommends additional testing and analyses of the Potential for Combat Effectiveness Model to develop additional data for use in future analyses.

Chapter One

INTRODUCTION

The purpose of this research is to explore the psychosocial dimensions of combat effectiveness as perceived by personnel in the Air Force civil engineering career field. In the aftermath of the Vietnam War, the combat role for Air Force civil engineering changed dramatically from one which was ill-defined to one with specific wartime tasks (Ashdown, 1984). The change necessitated an increase in the number of personnel trained for combat operations and an increase in the quantity of equipment on hand for deployment. Considerable progress has been made on both these needs. Ashdown's (1984) historical study of civil engineering readiness concludes, "the wartime capability of civil engineering forces has evolved from a very limited capability. . . to a very credible capability in 1983" (p. iii). An analysis of objective readiness factors would certainly reveal a significant improvement in civil engineering readiness over the years, but such an analysis would tell little of the often cited, war-winning "will to fight." This study attempts to supplement available objective data by evaluating the psychosocial perceptions of civil engineering personnel contributing to combat effectiveness.

Background

When the Air Force became a separate service in 1947, legislation and early agreements made the Air Force dependent upon the Army for troop construction and major wartime repair of air bases following attack. However, experiences during both the Korean and Vietnam wars showed the Army lacked the capability to support Air Force needs. The development of Air Force heavy repair, or RED HORSE, squadrons and the use of temporary duty personnel from base civil engineering organizations outside Vietnam temporarily eased the shortage of Air Force construction resources in southeast Asia, but much of this capability was deactivated following the Vietnam war (Bohlen, 1977). (The acronym, RED HORSE, stands for Rapid Engineer Deployable, Heavy Operational Repair Squadron, Engineer.)

In the mid 1970s, the Joint Contingency Construction Requirements Study, or JCCRS II, recognized a significant shortfall in Air Force engineering forces to perform wartime base recovery including rapid runway and bomb damage repair. Subsequently, the JCCRS II was used as the basis for a total reorganization of the Prime Base Engineer Emergency Force (Prime BEEF) program (Lupia, 1982). The Prime BEEF program was initially developed during the Vietnam war to provide mobile engineering forces from base civil engineering assets for response to contingency situations and natural disasters. Following completion of the JCCRS II, the program placed more emphasis on civil engineering's combat role. Since 1978, Air Force civil engineering has pursued a continuous program of training, equipping, and exercising these forces to enhance their warfighting capability (Ashdown, 1984). According to a March 1984 T.I.G. Brief (Civil Engineering Readiness) article, "Operational Readiness Inspection and Mission Capability Inspection . . . reports from six major commands showed our civil engineering forces were, for the most part, properly organized, trained, and equipped and could perform their assigned mission and do it well" (p. 7).

Our ability to objectively measure the readiness of civil engineering forces, however, is tied largely to a measurement system which received much criticism in the post-Vietnam period. In addition to other weaknesses, some critics imply a lack of integrity among those responsible for reporting readiness and the inappropriateness of the readiness measures themselves (Bittner, 1983; Waller, 1982). Air Force Regulation 55-15, Combat Readiness Reporting, provides guidance on the Unit Status and Identity Report (UNITREP) which measures readiness based upon numerical counts of four broad areas: personnel, equipment and supplies on hand, equipment readiness, and training. On top of these objective measures, the unit commander provides his or her assessment of the unit's overall readiness weighing both the measured data and any nonmeasured factors which may pose limitations. The unit commander's assessment is a key factor in the rating system, but critics believe this assessment is not always free from bias. Further, critics claim the military concentrates too heavily on the numbers and gives too little attention to subjective assessments. While there is no specific evidence of a problem with Air Force civil engineering readiness reporting, the arguments raised propose a need to examine readiness of our forces from supplementary points of view whenever possible.

The belief that current means of measuring combat effectiveness overlook the qualitative or psychosocial factors of readiness prompted the Leadership Management and Development Center (LMDC) at Maxwell AFB, Alabama, to develop the Potential for Combat Effectiveness Model (PCEM) and its related attitudinal measurement instrument, the Combat Attitude Survey (CAS). The model focuses on psychosocial dimensions which theoretically contribute to combat effectiveness, including individual perceptions of leadership, morale, combat motivation, and unit cohesion. The CAS and its companion survey instrument, the Organizational Assessment Package (OAP), also measure a number of secondary factors contributing to combat effectiveness. These instruments are discussed in more detail in Chapters Two and Three.

Research Goals

This research examines the quantitative PCEM variables as measured by the CAS and the OAP. The study compares civil engineering responses on PCEM variables with Air Force averages to determine relative strengths or weaknesses and makes recommendations for further study. To that end, this research pursues three goals:

1. To conduct a review of current research and theory on the psychosocial dimensions of combat effectiveness for the purpose of identifying those variables having the greatest impact on the willingness to fight;

2. To compare PCEM results for civil engineering personnel to those of other Air Force personnel groups to determine if there are significant differences in individual perceptions of any of the combat readiness dimensions; and

3. To develop recommendations for further research on the use of the PCEM as a diagnostic tool.

The report addresses each of these goals as follows. First, Chapter Two presents the results of the literature review, highlighting variables which appear to have the greatest theoretical impact on combat effectiveness. Chapter Two also discusses the PCEM and introduces the research hypotheses used in this study. Chapter Three presents the procedures used in this study, including more specific information on the CAS and OAP, their application, and the data base for the current research. Chapter Four then provides the results of the statistical tests performed on the PCEM variables. Finally, Chapter Five presents a discussion of the results, concluding remarks, and recommendations for further research.

Chapter Two

LITERATURE REVIEW

"No aspect of a nation's military strength has proven more important than the attitudes of its soldiers, sailors, and airmen toward their profession and toward one another." This quote by Major General C. D. Dean, U.S. Marine Corps, introduces a study by J. H. Johns (1984, p. v) on critical questions affecting human behavior in combat. While there is an abundance of literature on the motivation of soldiers in combat, including a number of studies which followed World War II, few models have been established to forecast a unit's psychological readiness to fight. This chapter briefly reviews the theory behind LMDC's Potential for Combat Effectiveness Model (PCEM) and one of its related attitude measurement instruments, the Combat Attitude Survey (CAS). The theory is then followed by the research hypotheses for the current study.

The Research

According to Kellet (1982), the interest in psychological aspects of combat appears to run in cycles. The aftermath of World War II brought a surge in research seeking the underlying reasons as to why some units are more successful than others in combat. However, the interest in combat motivation as it pertained to conventional warfare subsided as we entered the nuclear era. It was not until the Vietnam War that this interest was again rekindled. Criticism over the outcome of the Vietnam War and the inception of the all volunteer military raised a number of questions concerning military readiness. Sarkesian (1980) presents a critical analysis of the current readiness measurement techniques and asserts the need to measure readiness from different dimensions "identifying political-psychological factors and the motivations that are essential for military cohesion in terms of the individual soldier, leaders, and unit integrity" (p. 16). Kish (1982) proposes an immediate need to identify the psychological factors of readiness and to begin enhancing them without delay. In his study, he states, "in a short notice 'come as you are war' there will be insufficient time for an external threat to congeal our fighting units. . . . We must have cohesive units before the war begins" (Kish, 1982, p. 6). Kish adds emphasis by stating "psychiatric casualties [of modern combat] will greatly exceed those experienced in World War II and Korea. Whereas our experiences in those wars indicated that 25-30 days on the line were necessary to generate stress casualties, the Israelis encountered them in 24 hours in their 1973 war" (1982, p. 6).

The literature on military motivation suggests a number of psychosocial factors affecting human behavior in combat. Many of the more notable recent works, such as <u>Fighting Spirit: A Study of Psychological Factors in War</u> (Richardson, 1978) and <u>Combat Motivation: The Behavior of Soldiers in Battle</u> (Kellett, 1982), contain extensive reviews of historical writings and research conducted on combat effectiveness. However, despite all the effort of psychologists and social scientists, Hauser (1980) remarked, "somehow we are not much closer than before to understanding individual (let alone group) motivation under the awful stresses of the battlefield" (p. 186). But the search goes on. As part of his student research project, Waller (1982) performed a broad literature review on the psychosocial dimensions of combat effectiveness. His study focused on four interrelated concepts which appeared most often in literature and which "make up the spirit of the army": group cohesion, leadership, morale, and the willingness to fight.

Group cohesion is undoubtedly the most widely proclaimed psychosocial factor contributing to a unit's staying power in battle. According to Henderson (1985), "Mao recognized that in modern war the individual soldier is alone except for two or three close comrades on his right and left. . . . For this reason, the significance of the small unit to which the soldier belongs can hardly be overstated" (p. 5). Waller cites the studies of the German army in World War II by Shils and Janowitz (1948) as "probably the most definitive, if not one of the earliest works on the importance of cohesion in combat success" (p. 14). Shils and Jonowitz found the sustained effectiveness of German units to be based upon cohesion derived from loyalties generated and sustained by primary groups. They found soldiers developed a responsibilty to their peers and superiors based upon mutual risk, hardship, and the belief that their superiors really cared for them and would endure similar circumstances. Cohesion had a synergistic effect enabling a unit to sustain itself under the stress of combat.

While group cohesion is certainly a key factor in combat effectiveness, it can also have adverse effects. Wesbrook (1980) quotes Helmer's study of soldiers in the Vietnam War which showed "where primary group solidarity existed, more often than not it served to foster and reinforce dissent from the goals of the military organization" (p. 257). Wesbrook concludes cohesive groups are only effective when the standards they enforce and the objectives they promote are linked with the requirements of formal authority.

The critical link is leadership.

Historians and scholars have long focused on the importance of leadership to combat effectiveness. Richardson (1978) states leadership "is really the most important single factor in the preservation of high morale and the prevention of psychiatric casualties. With good leadership all the other factors are taken care of instinctively" (p. 79). The type of leadership necessary to build a cohesive unit emphasizes personal, empathetic, and continuing face-to-face contact with all the soldiers in the unit. To be most effective in combat, leadership must be emphasized at the small unit level where its most pervasive form, leadership by example, is strongest. Kellett (1982) cites a study of World War II veterans by Stouffer et al. (1949) which reveals leadership by example and personal courage as the most often cited characteristics of officers who helped their men through frightening situations. There is some concern today, however, that our officers are not providing the leadership required to produce cohesive units. According to Johns (1984), "a persistent finding in surveys on leadership is that junior personnel do not believe their leaders care for them as individuals" (p. 38). Johns' study group believes there is too much impersonal management behavior.

The third factor proposed by Waller (1982) as contributing highly to combat effectiveness is morale. Morale is a vital factor in building unit cohesion and is enhanced by good leadership style. Richardson (1978) emphasizes the role of morale by Field-Marshal Montgomery's quote: "The morale of the soldier is the greatest single factor in war" (p. 1). In general, individual and group morale reflect attitudes relating to confidence, enthusiasm, and zeal toward persevering toward a goal. According to Havron (1984), the best means of assuring good morale is to develop a unit's ability to perform in an exceptional manner and recognize that ability. "Success, pride, satisfaction of individual needs, realization of group goals, and positive leadership play interrelated roles. The more the individual satisfies his or her needs, the more he or she feels a part of the unit" (p. 7).

The fourth and final psychological element Waller (1982) highlights is willingness to fight. Waller states willingness to fight is the product of the society from which the soldier has evolved. "The lack of a strong national will or resolve will find its way into a soldier's individual will to fight and destroy the effectiveness of a combat unit" (p. 23). But the will to fight is not merely a product of national resolve. Waller further states the military has the responsibility to mold or reshape the social values of soldiers in order to harness them into an effective fighting force. Hauser (1980) takes a philosophical approach and proposes a complex and interrelated model consisting of four factors: submission to military authority, fear of punishment and of loosing the support of the unit, loyalty to unit and cause, and pride in self-worth and unit mission. According to Hauser, the military has the ability to influence each of these factors to enhance the will to fight.

The Model

Based on the four concepts--cohesion, leadership, morale, and willingness to fight--proposed by Waller's (1982) review, LMDC researchers hypothesized a four-component model of combat effectiveness shown in Figure 1. The model measures effectiveness based on both combat and general

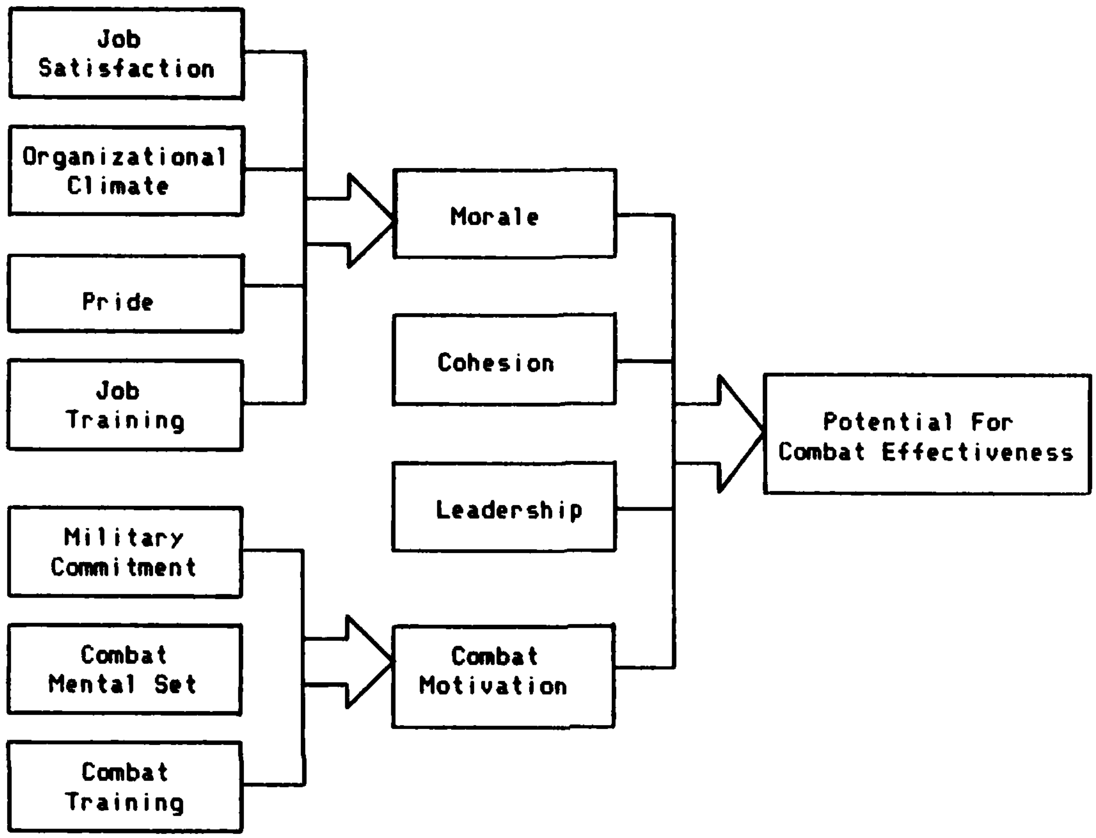

Figure 1. Potential for Combat Effectiveness Model

organizational measures. In theory, the model's four primary factors leading to an overall measure of Potential for Combat Effectiveness are the same as those proposed by Waller except that the component Willingness to Fight has been renamed Combat Motivation. LMDC researchers (Brown, 1985) define these components as follows:

Cohesion

Cohesion is the bonding together of members of a unit or organization in such a way as to sustain their will and commitment to each other, their unit, and the mission (Defense Management

> Study Group on Military Cohesion, 1984) [Johns, 1984]. Cohesion measures the individual's desire to remain in the group and the commitment to respond to group needs and standards. (p. 9)
>
> Morale
>
> Morale in the broadest sense is a measure of general life satisfaction. Morale is a combination of job satisfaction; general attitude toward the supervisor, co-workers, and the organization; pride in own and group achievements; and satisfaction with job-related training. (p. 9)
>
> Combat Motivation
>
> Combat motivation is one's motivation or willingness to fight (Kellett, 1982; Richardson, 1978) and is measured from three components: Military Commitment, Combat Mental Set, and Combat Training. (p. 10)

According to Brown (1985), Military Commitment measures the responsiblity of an individual to the military organization and the Air Force life style. Combat Mental Set measures a member's general attitude toward war and combat, and Combat Training measures the extent combat exercises and training enhance skills for combat and the unit's readiness to meet combat stress.

The final PCEM component, Leadership, is measured primarily through LMDC's Organizational Assessment Package (OAP), a companion instrument to the CAS, and is defined in OAP Survey: Factors and Variables (LMDC, 1986) as follows:

> Leadership
>
> Leadership measures the degree to which the worker has high performance standards and good work procedures. Measures support and guidance received, and the overall quality of supervision. (p. 14)

In addition to the OAP items used to assess leadership, the CAS contributes an additional survey item which rates the supervisor on a "good leader" dimension. Specific OAP and CAS items used in formulating PCEM variables are provided in Appendix B.

Although the model is based upon variables which have generally been associated with successful combat units, it is relatively untested. The model's key measurement instrument, the CAS, has only been in use since 1982. None of the units surveyed with the CAS has performed in combat, and this fact raises serious questions as to the model's ability to forecast combat effectiveness per se. Waller's (1982) factor analysis of the PCEM showed the major dimensions contained in the model are morale, leadership, and cohesion. Willingness to Fight was not identified in his final factor solution. According to Waller (1982), the absence of this variable in the factor analysis "left the combat effectiveness model without one of the major dimensions identified in the literature as a key contributor to combat effectiveness" (p. 67). Waller's multiple regression analysis further provided evidence that all of the relative combat effectiveness scales were significant predictors of an individual's perception of his unit's combat readiness; however, the amount of variance explained was disappointing. LMDC researchers (Brown, 1985) also found the need for additional measures of combat effectiveness to be developed and investigated as a means of providing validation to the model.

In view of his findings, Waller (1982) suggests further study on units actually employed in combat. Given no combat troops to survey, he proposed another avenue for possible research involving separation of respondents surveyed by the type of duty performed. Waller states, "The value of the dimensions contained in the model could be completely different in a unit which is strictly involved in a support role. . . and a unit which would be directly involved in a conflict" (p. 111).

As noted in Chapter One, Air Force civil engineering units have been involved in an accelerated training program since the mid 1970s to prepare for a combat role recognized at that time. Based upon Waller's supposition, one could expect significant differences between civil engineering combat attitudes and those of other support organizations having less definite wartime roles. This hypothesis is mildly supported by Johns' (1984) study which found officers in support units having more occupational tendencies than those in combat units. He suggests a more occupationally-oriented group would show less cohesiveness than a group which considers itself more as professionals. Support units, then, could more likely show lower scores on PCEM variables, particularly with respect to group cohesion. On the other hand, it would be doubtful these differences would be so strong as to produce statistically significant differences in survey results between civil engineering personnel and the Air Force as a whole.

The Hypotheses

This research will test two major hypotheses. The first hypothesis attempts to determine if there are any differences between civil engineering PCEM scores and those of other support organizations within the Air Force. Based on the literature review, the author predicts civil engineering will have higher PCEM scores than other support personnel. The null and alternate hypotheses in this case state:

H_0: There are no differences between mean PCEM scores for civil engineering personnel and for those of other support units.

H_A: The mean PCEM scores for civil engineers are significantly higher than for other support personnel at the .05 probability level.

The second hypothesis compares civil engineering PCEM scores to those of the Air Force in general. The author makes no specific prediction for this comparison. The null and alternate hypotheses in this case state:

H_0: There are no differences between mean PCEM scores for civil engineers and for those of personnel in the Air Force in general.

H_A: The mean PCEM scores for civil engineers and for personnel in the Air Force in general are significantly different at the .05 level.

The next chapter describes the method used to test these hypotheses.

Chapter Three

METHOD

This chapter outlines the approach taken to accomplish the research objectives stated in Chapter One. Of primary interest is the identification of strengths and weaknesses in Air Force civil engineering perceptions of combat readiness. The approach taken to accomplish the research objectives is discussed in four parts in this chapter. First, the survey instruments are discussed. Second, the method of data collection is reviewed. Next, a brief description of the subjects in the comparison groups is presented, and finally, the procedures of the analyses are described.

Instrumentation

As discussed in the previous chapter, the Potential for Combat Effectiveness Model (PCEM) measures potential effectiveness based on both combat attitude perceptions and general organizational measures such as leadership and various factors contributing to morale. The Combat Attitude Survey (CAS) is designed to measure the combat motivation factors and assist in measuring a few of the organizational components of the model. A companion survey instrument, the Organizational Assessment Package (OAP), provides most of the general organizational measures which pertain to leadership and the factors of job satisfaction, organizational climate, and pride.

Three years prior to the introduction of the CAS, LMDC and the Air Force

Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, jointly developed and tested the OAP (Short, 1985). The OAP provides 16 demographic items and 93 attitudinal items pertaining to job satisfaction and organizational climate. Twenty-eight of the OAP attitudinal items are used to measure PCEM components. Short and Hamilton (1981) conducted a factor by factor reliability assessment of the OAP and found it showed "generally acceptable to excellent reliability for the primary OAP factors" (p. i). The findings of Hightower and Short (1982), after two years of field use, also supported the use of the OAP as a data gathering instrument.

The CAS is a 70-item survey instrument which supplements the OAP in measuring the components of Job Training, Combat Mental Set, and Combat Training. CAS items also contribute heavily to the components of Cohesion and Military Commitment, and mildly to Leadership. Both the CAS and the OAP use a response scale of 1 to 7, with the value of "1" generally indicating strong disagreement or dissatisfaction with the question or statement, and a "7" indicating strong agreement or satisfaction. The CAS and OAP items which pertain to PCEM components are listed in Appendix B. As discussed in Chapter Two, the CAS has had limited testing and validation, but it has been shown to be a relatively accurate measurement instrument.

Data Collection

The Leadership and Management Development Center (LMDC) located at Maxwell Air Force Base, Alabama, was established in 1975 as a focal point for developing better leadership and management for Air Force people and units. One of LMDC's primary missions was to provide a management consultation service, but LMDC provided this service only upon written request of a major unit commander or agency chief.

The main survey instrument used during an LMDC visit was the OAP. After the CAS was developed in 1982, it was also used in data gathering, although the CAS was only administered to units which had direct combat missions. The data were gathered in group sessions by an LMDC team of four to seven people with all base units surveyed over a week-long period. LMDC treated their data analyses in a confidential manner between themselves and client commanders. Because data was only collected upon invitation, the resulting data base used in this study must be considered an opportunity sample, not a random sample.

The data analyzed in this research are the cumulative result of OAP-CAS linked survey administrations conducted between January 1982 and May 1985. During this period, 54,779 cases were collected from 27 Air Force installations, 11 of which are located overseas. These cases form the active data base. In addition to the 16 demographic items included in the OAP, other demographics of interest to this research effort (which were stored on each record) include personnel category, Air Force Speciality Code (AFSC), and major command of assignment. The distribution of responses by major command is shown in Table 1. Note that over half the respondents were stationed overseas during the survey administration.

Table 1

Data Base Distribution by Major Command

Command:	AFCC	AFSC	ATC	MAC	SAC	TAC	USAFE	PACAF	OTHER
Responses:	2395	18	1069	2636	4974	11,211	26,425	9269	3998

Subjects

To examine the perceptions of base civil engineering personnel, PCEM responses were taken from the active data base to form three comparison groups: civil engineering, AF data base, and support personnel. The civil engineering group consists of officer and enlisted personnel serving in AFSCs applicable to base civil engineering positions. The AF data base group is comprised of officers and enlisted personnel in the remainder of the OAP-CAS data base. The support group includes those who perform base support and maintenance activities, excluding base civil engineering. This group consists of all personnel contributing to the AF data base minus personnel in the base civil engineering career field and those who normally have "hands on" operational or maintenance responsiblities on USAF weapon systems--pilots, navigators, missile crews, and personnel serving in aircraft, weapons, and missile maintenance units. Support group personnel serve in functional areas such as administration, supply, medical, weather, personnel, and transportation. A complete list of AFSCs applicable to the comparison groups is shown in Table 2. Sample sizes for the groups are indicated in Table 3, and further demographic characteristics are provided in Appendix A.

While Waller (1982) suggested a possible difference in perceptions between combat units and support units, the distinction between Air Force units which are strictly one or the other is difficult to make. For the purpose of this study, normal duty requiring "hands on" contact with a weapon system roughly defined combat units. This definition is naturally open to debate. The purpose of proposing a support personnel comparison group is to

Table 2

Comparison Group AFSCs

	Officer	Enlisted
Civil Engineers	55XX	54XXX thru 57XXX
Support	23XX thru 30XX, 51XX, and 57XX thru 99XX	10XXX, 12XXX thru 30XXX, 32XXX thru 40XXX, 47XXX thru 51XXX, and 59XXX thru 98XXX
AF Data Base	All minus 55XX	All minus 54XXX thru 57XXX

test for any possible effects that civil engineering's emphasis on its wartime role may have on its readiness perceptions relative to the readiness perceptions of other base support functions.

Table 3

Sample Size of Comparison Groups

	Officers	Enlisted
Civil Engineers	168	2,979
Support	1,937	25,211
AF Data Base	4,400	36,526

Procedures

Three data comparisons are performed in this study. The first, "Analysis of Demographic Information," is provided only to characterize the sample groups. The "Comparison of Civil Engineering Personnel to Support Personnel" compares perceptions of the two groups on PCEM variables, including the overall Potential for Combat Effectiveness measure and its contributing components: Cohesion, Morale, Combat Motivation, and Leadership. Finally, the third comparison, "Comparison of Civil Engineering Personnel to the AF Data Base," provides a similar comparison of PCEM variables for these two groups.

The number (n) shown throughout this study is the total number of valid responses in the CAS-OAP data base for the demographic item or combat attitude variable being examined. Statistical analyses were performed using the appropriate computerized procedures contained in the SPSSX User's Guide (1983).

Comparison 1, Analysis of Demographic Information

For this analysis, the LMDC data base was divided into the three groups defined above, and the SPSSX subprogram "Crosstabs" was used to present the demographic data in two-way tables for analysis.

Comparisons 2 and 3, Comparisons of Civil Engineering Personnel to Support Personnel and the AF Data Base, Respectively

For these analyses, civil engineering personnel's perceptions of PCEM variables were compared to the perceptions of support personnel and the AF data base, independently. Two-tailed *t*-tests were performed to discern any attitudinal differences between groups within each personnel category. The level of significance for all *t*-tests was the 95% confidence level (i.e., alpha = .05). An *F*-test was used to test the assumption of equal variances. Where indicated appropriate, *t*-tests for unequal variance groups were used. These procedures were used to determine the attitudinal variables in which civil engineering perceptions vary significantly from those of either support personnel or the average Air Force individual represented by the AF data base.

The next chapter presents the results of these statistical comparisons.

Chapter Four

RESULTS

This chapter presents the results of the statistical analysis conducted on the Potential for Combat Effectiveness Model (PCEM) variables. After a brief look at a few of the more significant demographic variables, the tests results of the study hypotheses are presented.

Analysis of Demographic Information

Only a few of the demographic variables showed any appreciable differences between the comparison groups. Those showing the largest differences pertained to personnel category (officer vs. enlisted), sex, age, educational level, and career intent. Both the civil engineering and support samples have a significantly smaller percentage of officers than the AF data base. Whereas officers represent 11% of the AF data base, the percentage of officers in the civil engineering and support samples were 5% and 7%, respectively. Also, on a percentage basis, the civil engineering sample contains substantially fewer female members (4%) than either the support sample (15%) or the AF data base (13%). The civil engineering sample is also slightly younger than either of the comparison groups. Just under 76% of the civil engineers are under 31 years of age as compared to 72% of the support sample and 70% of the AF data base. The difference in age distribution within groups is particularly noticeable among the officers. While approximately 10% of the support and AF data base officers are under 26 years of age, 25% of the civil engineering officers are within that group. With respect to educational level, the civil engineering sample was on the average less educated than either the support group or the AF data base. These groups both have over 58% of their personnel possessing at least some college education, while the civil engineering sample only shows 48%. Finally, there is a definite difference in the stated career intent of the sample of civil engineering officers as compared to other officers. When asked which best describes career or employment intentions, 76% of the support group officers and 77% of the AF data base officers responded positively that they "will" or "most likely will" continue their careers. Only 60% of civil engineering officers respond similarly. Enlisted responses to the same question show relatively little difference between groups. Tables A-1 through A-21, Appendix A, provide more detailed information on these and other demographic variables.

Hypotheses Tests Results

Two hypotheses were presented in Chapter Two. The first proposed that the means for the PCEM variables would be higher for civil engineering personnel than for support personnel. The second proposed no significant differences between the combat perceptions of civil engineers and the AF data base. The results of the statistical analysis of mean scores relevant to both hypotheses are provided in Table 4. This table presents two sets of *t*-tests: civil engineers versus support and civil engineers versus AF data base. The asterisked *t*-values denote for which group comparison, if any, civil engineers had significant differences in mean scores.

With respect to the first hypothesis, the mean scores of the civil

Table 4

Table 4. Civil Engineering vs. Support and AF Data Base

Component/Sub-component Comparison Group	Mean	Std Dev	*df*	*t*-value
Potential for Readiness				
Civil Engineers	4.96	0.90		
Support	4.83	0.92	15323	5.61 ***
AF Data Base	4.91	0.92	25690	2.12 *
Cohesion				
Civil Engineers	5.12	1.16		
Support	5.01	1.24	3915	4.59 ***
AF Data Base	5.05	1.24	3474	2.90 **
Morale				
Civil Engineers	4.85	1.09		
Support	4.66	1.15	3296	8.14 ***
AF Data Base	4.70	1.15	2926	6.36 ***
Job Satisfaction				
Civil Engineers	5.19	1.16		
Support	4.94	1.26	3745	10.48 ***
AF Data Base	4.94	1.26	3313	10.89 ***
Organizational Climate				
Civil Engineers	4.37	1.37		
Support	4.20	1.46	3969	6.21 ***
AF Data Base	4.22	1.46	3533	5.87 ***
Pride				
Civil Engineers	5.03	1.57		
Support	4.81	1.65	4099	7.26 ***
AF Data Base	4.90	1.63	3636	4.42 ***
Job Training				
Civil Engineers	4.74	1.35		
Support	4.60	1.40	3843	5.25 ***
AF Data Base	4.71	1.38	40386	1.36

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

Table 4 (Cont.)

Civil Engineering vs. Support and AF Data Base

Component/Sub-component Comparison Group	Mean	Std Dev	df	t-value
Combat Motivation				
Civil Engineers	4.98	0.95		
Support	4.89	0.99	3448	4.63 ***
AF Data Base	5.01	0.98	3056	-1.68
Military Commitment				
Civil Engineers	5.41	0.95		
Support	5.37	0.96	23751	2.03 *
AF Data Base	5.42	0.96	39895	-0.80
Combat Mental Set				
Civil Engineers	5.11	1.50		
Support	5.05	1.59	4085	2.10 *
AF Data Base	5.25	1.55	3599	-4.74 ***
Combat Training				
Civil Engineers	4.37	1.16		
Support	4.20	1.22	3862	7.23 ***
AF Data Base	4.33	1.21	3414	1.82
Leadership				
Civil Engineers	4.81	1.53		
Support	4.75	1.56	23985	2.21 *
AF Data Base	4.77	1.54	40199	1.41

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

engineering sample proved significantly higher than for the support sample on each measure, as predicted. The testing of the second hypothesis provides mixed results. While the mean score for the overall Potential for Combat Effectiveness measure was significantly higher for the civil engineering group, two of the contributing components, Combat Motivation and Leadership, showed no significant differences from the AF data base. Within Combat Motivation, however, the Combat Mental Set sub-component measured significantly lower for the civil engineering group. This sub-component measures individual perceptions toward readiness to fight. The other two major PCEM components, Cohesion and Morale, proved significantly higher for civil engineering than for the AF data base. Civil engineering perceptions on the Job Training sub-component, however, were neither significantly higher nor lower than those of the AF data base.

Chapter Five

DISCUSSION

Summary of Results

The results of this research generally support the research hypotheses. The means for the major components of the Potential for Combat Effectiveness Model (PCEM)--Cohesion, Morale, Combat Motivation, and Leadership--as well as their sub-components, were all significantly higher for civil engineering personnel than for those in other support organizations. On the other hand, the results were positive but mixed in the comparison between civil engineering personnel and those represented by the AF data base. In the latter comparison, the overall Potential for Combat Effectiveness measure, as well as the measures for Cohesion and Morale, were significantly higher for civil engineering; however, there were no significant differences in the Combat Motivation and Leadership components.

Discussion of Results

Although the tests of both research hypotheses found significant differences in most PCEM measures, the numerical differences in mean scores are very small. These small variations tend to bring to question the practical implications of the research findings. As predicted, civil engineering fared well in comparison to the target groups, but not overwhelmingly so. Regardless, some noteworthy strengths were found.

The largest difference for civil engineers in PCEM scores, 0.25 points, occurred in the Job Satisfaction sub-component of Morale in comparison to both target groups. Responses to two survey items which contribute to the Job Satisfaction area are particularly strong. The largest difference in item responses occurred with item O108, listed under Job Satisfaction in Appendix B. This item attempts to ascertain the respondent's appreciation for the chance to acquire valuable skills within his or her career field. The civil engineering mean for this item is 5.08, which is 0.46 points greater than the average Air Force score and 0.45 points higher than the average response from other support organizations. Civil engineers are also highly satisfied with their work schedules compared to the average Air Force member. Reference item O106, in which the civil engineering mean is 5.07 (0.39 points higher than the Air Force mean). Against other support organizations, the 0.30 point difference, however, was not as strong. While responses to the other items contributing to Job Satisfaction were also higher for civil engineering in both comparisons, these two items were the most influential.

Another observation deserving mention is highlighted in the Combat Motivation component of the model. Within the Combat Motivation area, the civil engineering mean for Combat Mental Set is both significantly higher than that of the support group and significantly lower than that measured for the AF data base. The same general relationship, although without statistical significance, exists in the Military Commitment sub-component. The average mean scores for the Air Force, represented by the AF data base, are higher than those for civil engineering, and civil engineering's mean scores are higher than those of other support organizations.

These examples highlight the fact that, except for Job Satisfaction, the means of all component and sub-component measures are increased, although slightly, by adding "combat" personnel scores to the support group. This fact supports Waller's (1982) prediction that "the dimensions contained in the model could be completely different in a unit which is strictly involved in a support role. . . and a unit which would be directly involved in a conflict" (p. 111). While the data supports the general prediction, the differences are small, and no statistical tests were performed between the support group and AF data base means. From these results, however, it can be expected that combat units will generally, if not always, score higher than support units.

Another interesting note within the Combat Motivation component is the response to the survey item concerning chemical warfare preparedness, item number C58, listed under Combat Training in Appendix B. Civil engineering responses were particularly strong relative to the comparison groups. The civil engineering mean response is 4.33, 0.40 points higher than that of other support organizations and 0.32 points higher than the Air Force average. Emphasis on chemical warfare training has obviously had an impact on civil engineering personnel.

Finally, the civil engineering response to the PCEM component of Leadership deserves mention. Although civil engineering's mean is significantly higher than the support group mean, the small difference in means and relatively large standard deviation cast doubt on the practical significance of the difference. The relatively small mean differences in the Leadership component may be partially explained by the stronger negative career intent civil engineering officers expressed compared to that expressed by officers of the target groups. The survey data for this research were obtained during a period of high engineer turnover, and as shown in Table A-21, Appendix A, civil engineering officers responded to the career intent item more negatively than the comparison groups. This negative career attitude could contribute to a relatively lower Leadership measure.

Overall, the results of this research do not necessarily demand immediate attention nor any form of corrective action. However, the results should certainly be encouraging to those in the civil engineering career field who have worked to improve the readiness of civil engineering forces. All together, civil engineering personnel fared very well compared to other support personnel, and even compared to the Air Force as a whole. The only concern for civil engineering lies with Combat Mental Set, a sub-component of Combat Motivation. The survey results on Combat Mental Set show civil engineering has significantly less confidence in its combat abilities than the average Air Force member. However, when the effect of more combat-oriented personnel's responses are removed from the data, the civil engineers show significantly more confidence than their fellow support personnel.

Conclusions

Although this study shows civil engineering attitudes contributing to combat effectiveness are on the average higher than those of most other Air Force members, it must be remembered that the PCEM has never been tested with combat troops. Whether units scoring higher on PCEM measures will be mentally stronger in the face of combat is still unknown. As Sarkesian (1980) states, "In the final analysis, the only sure measure of combat effectiveness is the performance of the unit in actual combat" (p. 11).

Additional testing of PCEM measures on combat troops is the only way to convincingly prove the validity of the model. The foundation of the PCEM, however, is based upon substantial research conducted since World War II, largely on combat veterans. In view of the evidence presented in this reseach, it is not unreasonable to believe that high perceived values of psychosocial dimensions measured by the PCEM do contribute to combat effectiveness. The components of the model are, therefore, potentially valid indicators of a "willingness to fight."

Another problem, however, lies in determining just how high a unit should score on the PCEM measures. As mentioned earlier, Waller (1982) believed differences would occur between units trained for wartime roles and those involved primarily in support. Similarly, researchers investigating job satisfaction found different levels of "measured" job satisfaction between various types of jobs. For example, middle management generally perceived higher levels of job satisfaction, as measured by Hackman and Oldham's Job Diagnostic Survey (JDS), than technicians or clerks. Researchers, therefore, found it necessary to compare JDS scores for a specific job under study to normative values of similar job categories. Normative JDS values have consequently been developed for various job categories by Oldham, Hackman, and Stepina (1978). Normative values for the PCEM have not been established; perhaps they should. "Combat" units, because of the nature of the jobs they are trained for, may achieve entirely different (higher) scores than those units normally involved in support. As a consequence, the aggregation of PCEM scores into an Air Force average for comparison purposes may be inadequate to produce meaningful results. Although this study specifically identified a subset to the Air Force average for comparison, the support group, further break down of PCEM data may be beneficial in future comparisons.

Other approaches to analyzing the PCEM data base may also provide interesting and meaningful results. Rodefer (1986) conducted a concurrent research effort on the PCEM focusing on possible differences in responses based on demographic variables such as personnel category (officer versus enlisted personnel), sex, and duty location. Of particular interest to this study are her results concerning respondents' sex and personnel category. Rodefer found females scored significantly lower in all PCEM measures as compared to males. As noted in Chapter Four, the civil engineering sample used in the current study had a much smaller percentage of females than either the support or AF data base comparison groups. This smaller percentage of females may have helped boost the civil engineering means relative to the other groups. With respect to personnel category, Rodefer found officers scoring higher than enlisted personnel on all PCEM measures. Again, as noted in the previous chapter, the civil engineering sample has a smaller percentage of officers compared to the other two groups. The effect of a smaller number of officers would be opposite that of the small number of females and would tend to hold the civil engineering score down relative to the other groups. Rodefer postulates a number of causes for the variances, but no scientific tests of causal relationships were performed. The effect of various demographics on group responses was not a part of this study. Still, further research on the PCEM data base focusing on other demographics may provide more insight and help improve future analyses.

Finally, the overall findings of this research tend to support Ashdown's (1984) comment that civil engineers are more ready now than ever before to support combat operations. While the author would like to conclude the relatively good standing civil engineering enjoys with respect to combat attitudes is a result of increased emphasis on readiness training which has occurred over the last seven years, this research was not structured to scientifically test that hypothesis. A pretest-posttest research design would have been more appropriate for that purpose, but adequate data were not available for such a design. However, this research undoubtedly portrays civil engineering personnel as having more positive combat attitudes than those of many other Air Force personnel, particularly in the support area. Because civil engineering is actually a support function with a peacetime service role similar to other support units, it is difficult to explain why their personnel measured higher in all PCEM components unless the constant emphasis on readiness training is taken into account.

Recommendations

After concluding this study, the author recognized additional studies should be performed to further analyze the validity of the Potential for Combat Effectiveness Model in forecasting combat performance. There is also a need to expand the data base to include combat personnel from other services for further comparison and analysis. For example, a study of the combat attitudes of Air Force civil engineers relative to those of Army combat engineers may provide more applicable and challenging results. Following are recommendations for further research:

1. Continue gathering survey responses from Air Force units, particulary those which may have been or most likely could be involved in combat, such as personnel who participated directly in the Grenada invasion.

2. Partition subjects in the Air Force data base by Air Force Specialty Codes reflecting the different functional areas to determine normative values of PCEM measures for particular units or types of units. Also, continue research on the effects of other demographic variables.

3. Expand the data base to other services to provide a broader base for comparison and analysis and to further study the idea that more combat-oriented units would score significantly higher on PCEM measures simply because of the nature of the tasking.

REFERENCES

Ashdown, F. A. (1984). A history of the warfighting capability of Air Force Civil Engineering. Maxwell AFB, AL: Air War College.

Bittner, R. (1983). UNITREP-It's not a four letter word. Air Force Engineering and Services Quarterly, 24(4), 34-35.

Bohlen, G. A. (1977). USAF engineer heavy repair/troop construction capability. Maxwell AFB, AL: Air War College.

Brown, R. (1985). Revision of the Combat Attitude Survey. Unpublished manuscript, Maxwell AFB, AL: Leadership and Management Development Center.

Civil Engineering Readiness--AFISC. (1984, March 5). T.I.G. Brief. pp 7-8.

Hauser, W. L. (1980). The will to fight. In S. C. Sarkesian (Ed.), Combat effectiveness: Cohesion, stress, and the all volunteer military (pp 186-211). Beverly Hills, CA: Sage.

Havron, S. L. (1984). Psychosocial dimensions of combat readiness--Leadership, morale, and group cohesion (Report No. 84-1195). Maxwell AFB, AL: Air Command and Staff College.

Henderson, W. D. (1985). Cohesion: The human element in combat. Washington, DC: National Defense University Press.

Hightower, J. M., & Short, L. O. (1982). Factor stability of the Organizational Assessment Package (LMDC-TR-82-1). Maxwell AFB, AL: Leadership and Management Center.

Johns, J. H. (1984). Cohesion in the U.S. military [Defense Management Study Group on Military Cohesion]. Washington, DC: National Defense University Press.

Kellett, A. (1982). Combat motivation: The behavior of soldiers in battle. Boston, MA: Kluwer-Nijhoff.

Kish, F. B. (1982). Cohesion: The vital ingredient for successful army units. Carlisle Barracks, PA: US Army War College.

Leadership Management Development Center. (1986). Organizational Assessment Package Survey: Factors and Variables. Maxwell AFB, AL.

CONTINUED

Lupia, E. A. (1982). When the baloon goes up. Air Force Engineering and Services Quarterly, 23(1), 24-27.

Oldham, G. R., Hackman, J. R., & Stepina, L.P. (1978). Norms for the Job Diagnostic Survey (Technical Report No. 16). New Haven, CT: School of Organization and Management, Yale University.

Richardson, F. M. (1978). Fighting spirit: A study of psychological factors in war. New York: Crane Russak.

Rodefer, J. M. (1986). Evaluation of the Potential for Combat Effectiveness Model for USAF personnel (Report No. 86-2145). Maxwell AFB, AL: Air Command and Staff College.

Sarkesian, S. C. (1980). Combat effectiveness. In S. C. Sarkesian (Ed.), Combat effectiveness: Cohesion, stress, and the volunteer military (pp 8-18). Beverly Hills, CA: Sage.

Shils, E. A., & Janowitz M. (1948). Cohesion and disintegration in the Wehrmacht in World War II. Public Opinion Quarterly, 12(2), 280-315.

Short, L. O. (1985). The United States Air Force Organizational Assessment Package (LMDC-TR-85-2). Maxwell AFB, AL: Leadership and Management Development Center.

Short, L. O., & Hamilton, K. L. (1981). An examination of the reliability of the Organizational Assessment Package (OAP) (LMDC-TR-81-2). Maxwell AFB, AL: Leadership and Management Development Center.

SPSSX user's guide. (1983). New York: McGraw-Hill.

Stouffer, S. A., Lumsdaine, A. A., Lumsdaine, M. H., Willams, R. M., Jr., Smith, B. M., Jani s, I. L., Star, S. A., & Cottrell, L. S., Jr. (1949). The American soldier: Vol 2. Combat and its aftermath. Princeton, NJ: Princeton University Press.

U. S. Department of the Air Force. (1982). Unit Combat Readiness Reporting (AF Regulation 55-15). Washington, DC: Government Printing Office.

CONTINUED

Waller, S. D. (1982). An evaluation of an attitudinal model to measure the potential for combat efectiveness of U.S. Air Force organizations. Master's thesis (LSSR 39-82), Department of Communications and Humanities, Air Force Institute of Technology, Wright-Patterson AFB, OH.

Wesbrook, S. D. (1980). The potential for military disintegration. In S. C. Sarkesian (Ed.), Combat effectiveness: Cohesion, stress, and the all volunteer military (pp 244-278). Beverly Hills, CA: Sage.

APPENDIX

Appendix A

Demographic Information

Table A-1

Sex by Personnel Category

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Male	Female	Male	Female	Male	Female
n =	2,998	140	22,709	3,749	35,592	5,253
Officer	160	7	1,033	214	3,824	566
Enlisted	2,838	133	21,676	3,535	31,768	4,687

Table A-2

Age by Personnel Category

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	166	2,956	1,243	25,149	4,375	36,356
17 to 20 Yrs	0.0	16.1	0.0	14.8	0.0	14.3
21 to 25 Yrs	25.3	43.0	11.0	39.4	9.0	39.6
26 to 30 Yrs	26.5	18.2	27.0	19.3	29.2	19.8
31 to 35 Yrs	20.5	12.2	26.0	13.8	25.2	13.9
36 to 40 Yrs	13.9	7.9	20.4	9.2	20.8	9.1
41 to 45 Yrs	10.8	2.2	12.7	2.7	11.2	2.6
46 to 50 Yrs	2.4	0.4	2.6	0.6	3.3	0.6
> 50 Yrs	0.6	0.1	0.4	0.1	1.4	0.1

Table A-3

Time in Air Force

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,965	1,247	25,189	4,390	36,407
< 1 Yr	8.3	9.2	2.2	7.5	1.5	6.8
1 to 2 Yrs	6.0	15.8	4.1	13.2	3.0	12.4
2 to 3 Yrs	11.3	12.9	7.3	13.2	7.6	13.0
3 to 4 Yrs	10.1	12.6	6.7	11.4	7.8	11.6
4 to 8 Yrs	19.6	19.0	21.7	20.0	23.8	21.5
8 to 12 yrs	10.1	11.2	14.4	12.7	17.2	13.0
> 12 Yrs	34.5	19.3	43.6	22.0	39.1	21.8

Table A-4

Months in Present Career Field

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	166	2,962	1,940	23,786	4,123	35,064
< 6 Mos	7.2	5.9	4.0	5.2	3.6	4.5
6 to 12 Mos	8.4	9.3	5.1	7.8	6.0	7.3
12 to 18 Mos	5.4	10.3	5.2	8.4	6.4	7.9
18 to 36 Mos	19.3	23.1	14.6	21.5	19.3	20.6
> 36 Mos	59.6	51.4	71.1	57.2	64.7	59.8

Table A-5

Months on Present Duty Station

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,961	1,940	23,804	4,140	35,090
< 6 Mos	13.1	16.6	15.6	16.3	13.9	15.1
6 to 12 Mos	20.2	19.6	17.4	18.7	17.5	17.8
12 to 18 Mos	16.7	17.8	17.0	16.6	16.4	16.2
18 to 36 Mos	37.5	31.6	36.3	34.2	37.2	35.5
> 36 Mos	12.5	14.4	13.7	14.2	15.1	15.3

Table A-6

Months in Present Position

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,953	1,935	23,749	4,130	35,006
< 6 Mos	27.4	26.8	24.1	29.2	26.6	27.6
6 to 12 Mos	29.8	23.4	22.6	24.5	25.8	24.2
12 to 18 Mos	13.1	16.6	16.2	16.9	16.4	17.0
18 to 36 Mos	25.0	23.9	28.2	22.6	24.5	23.5
> 36 Mos	4.8	9.2	8.9	6.8	6.8	7.7

Table A-7

Ethnic Group

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,959	1,247	25,085	4,375	36,237
Indian--Alaskan	0.6	1.5	0.6	1.4	0.7	1.4
Asian--Pacific	5.4	2.2	1.8	1.8	1.3	1.8
Black	4.2	14.6	9.6	18.1	5.5	17.0
Hispanic	4.2	5.6	3.5	5.1	2.4	5.3
White	81.5	72.1	81.8	70.1	87.5	71.0
Other	4.2	4.0	2.7	3.6	2.6	3.6

Table A-8

Marital Status

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,975	1,248	25,218	4,379	36,446
Not Married	25.0	38.3	20.4	37.9	19.9	37.3
Married	73.2	59.7	78.0	60.0	78.5	60.7
Single Parent	1.8	2.1	1.7	2.1	1.6	2.0

Table A-9

Spouse Employment Status: Civil Engineers

	Geographically Separated Off(%)	Geographically Separated Enl(%)	--Not Geo. Separated-- Off(%)	--Not Geo. Separated-- Enl(%)
n =	7	153	116	3,305
Civilian Enployed	57.1	57.5	41.4	35.7
Not Employed	14.3	35.3	50.0	54.6
Military Member	28.6	7.2	8.6	9.7

Table A-10

Spouse Employment Status: Support

	Geographically Separated Off(%)	Geographically Separated Enl(%)	--Not Geo. Separated-- Off(%)	--Not Geo. Separated-- Enl(%)
n =	43	1,362	930	13,781
Civilian Employed	51.2	58.0	29.5	33.6
Not Empolyed	16.3	25.6	56.1	48.7
Military Member	32.6	16.4	14.4	17.7

Table A-11

Spouse Employment Status: AF Data Base

	Geographically Separated Off(%)	Geographically Separated Enl(%)	--Not Geo. Separated-- Off(%)	--Not Geo. Separated-- Enl(%)
n =	145	1,927	3,305	20,189
Civilian Employed	55.2	28.5	28.5	33.7
Not Employed	22.8	61.4	61.4	49.9
Military Member	22.1	10.1	10.1	16.4

Table A-12

Educational Level

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,972	1,248	25,168	4,391	36,372
Non HS Grad	0.0	1.1	0.0	0.7	0.0	0.7
HS Grad or GED	0.0	53.5	0.3	43.8	0.3	46.1
< 2 yrs College	0.0	30.9	0.2	35.8	0.3	34.6
> 2 yrs College	0.0	12.3	0.7	15.9	1.5	14.9
Bachelors Degree	64.3	1.7	57.5	3.3	53.9	3.0
Masters Degree	32.7	0.4	40.3	0.5	35.4	0.4
Doctoral Degree	3.0	0.0	0.7	0.0	8.6	0.0

Table A-13

Professional Military Education

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,974	1,941	23,857	4,142	35,175
None	39.9	39.4	36.5	33.0	30.7	31.7
Phase 1 or 2	1.2	28.2	1.3	30.1	0.9	31.1
Phase 3	1.2	17.0	1.8	19.5	1.0	19.5
Phase 4	0.6	8.5	1.0	10.1	0.7	10.2
SNCOA - Phase 5	0.0	3.4	0.5	4.4	0.2	4.5
SOS	32.1	0.2	28.2	0.2	28.8	0.2
Int Service Sch	14.3	3.3	20.6	2.7	26.7	2.7
Sr Service Sch	10.7	0.0	10.1	0.1	11.0	0.1

Table A-14

Number People Directly Supervised

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,956	1,242	25,063	4,365	36,221
None	38.7	66.5	20.9	64.0	40.4	62.4
1 Person	3.0	5.2	9.3	7.6	7.7	7.4
2 People	4.8	5.3	9.0	6.7	6.8	7.3
3 People	9.5	4.7	11.2	5.6	7.2	5.5
4 to 5 People	17.9	8.3	19.8	7.6	13.8	7.6
6 to 8 People	13.7	3.7	14.5	4.0	10.7	4.4
9 or > People	12.5	6.4	15.3	4.5	13.3	5.4

Table A-15

Number People for Whom Respondent Writes APR/OER

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,968	1,246	25,187	4,381	36,386
None	42.3	69.1	25.6	66.9	48.5	65.5
1 Person	6.5	7.3	16.4	9.2	11.1	9.2
2 People	8.3	6.9	12.6	8.1	7.8	8.8
3 People	11.3	5.7	11.5	6.1	6.7	6.3
4 to 5 People	13.1	8.2	15.7	7.1	11.9	7.3
6 to 8 People	11.9	2.1	13.5	2.2	9.4	2.3
9 or > People	6.5	0.7	4.8	0.5	4.5	0.6

Table A-16

Supervisor Writes Respondent's APR/OER

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	165	2,935	1,230	24,914	4,341	36,004
Yes	72.1	67.3	79.1	71.7	78.5	69.0
No	20.6	21.8	11.5	17.4	13.7	20.1
Not Sure	7.3	10.9	9.3	10.9	7.8	10.9

Table A-17

Work Schedule

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,914	1,243	25,001	4,360	36,190
Day	94.0	67.3	79.6	61.8	51.9	56.6
Swing Shift	0.0	1.3	0.2	5.2	0.3	8.2
Mid Shift	0.0	0.5	0.1	2.9	0.0	3.6
Rotating Shift	0.0	17.1	2.8	16.0	4.3	15.1
Irregular Schedule	4.2	8.9	13.8	11.1	12.3	13.0
A Lot TDY/On-call	1.2	2.7	3.1	2.3	8.0	2.4
Crew Schedule	0.6	2.2	0.2	0.6	23.2	1.1

Table A-18

Supervisor Holds Group Meetings

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	165	2,928	1,236	24,826	4,353	35,918
Never	11.5	12.2	5.4	16.6	5.5	17.0
Occassionally	20.0	29.7	17.6	34.5	20.9	34.1
Monthly	6.7	5.9	8.3	7.1	17.4	7.0
Weekly	40.0	37.5	49.8	29.4	41.8	27.0
Daily	21.2	12.4	16.7	10.3	12.6	12.8
Continuously	0.6	2.2	2.2	2.2	1.8	2.1

Table A-19

Supervisor Holds Group Meetings to Solve Problems

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	165	2,920	1,226	24,643	4,322	35,626
Never	19.4	22.2	13.6	24.9	14.0	25.8
Occasionally	36.4	40.2	42.7	40.3	43.1	40.2
Half the Time	18.8	18.8	23.2	16.6	22.7	16.5
Always	25.5	18.8	20.6	18.2	20.2	17.5

Table A-20

Aeronautical Rating and Current Status

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	168	2,963	1,245	25,121	4,392	36,290
Nonrated	93.5	91.5	93.7	93.5	53.1	90.6
Nonrated, on crew	0.6	0.4	0.6	0.7	1.6	1.9
Rated, in crew/ops	0.6	1.5	0.3	0.9	36.6	1.6
Rated, in support	5.4	6.0	5.5	4.9	8.7	5.9

Table A-21

Career Intent

	-Civil Engineers-		-----Support-----		--AF Data Base---	
	Off (%)	Enl (%)	Off (%)	Enl (%)	Off (%)	Enl (%)
n =	166	2,962	1,243	25,128	4,384	36,299
Retire next 12 mo.	2.4	2.1	3.4	2.7	2.6	2.6
Definite career	44.6	33.3	58.2	33.5	53.5	33.6
Probabley career	15.7	17.4	18.3	18.8	23.2	19.4
Undecided	21.7	22.8	12.4	21.6	21.7	22.8
Probably not career	9.0	14.8	4.8	14.1	4.6	13.9
Separate likely	6.6	9.7	2.8	9.3	2.8	9.0

APPENDIX

Appendix B

OAP-CAS Survey Items

OAP-CAS Survey Items

The Potential for Combat Effectiveness Model components are derived from responses to survey items from both the Organizational Assessment Package (OAP) and the Combat Attitude Survey (CAS). The OAP consists of 16 demographic items and 93 attitudinal items which measure 23 factors describing group perceptions about job-related issues, supervision, work group effectiveness, and organizational climate. The CAS provides another 70 items which emphasize combat attitude perceptions. Responses to both surveys use a scale of 1 to 7, with a value of "1" generally indicating strong disagreement or dissatisfaction with the question or statement, and a "7" indicating strong agreement or satisfaction. Responses to various items are averaged to form Combat Effectiveness Model component and sub-component means. The overall Potential for Combat Effectiveness measure is determined by the following equation which weights and combines the values of Cohesion (I), Morale (II), Combat Readiness (III), and Leadership (IV):

$$\text{Potential for Combat Effectiveness} = (I + 3*II + 5*III + IV)/10$$

OAP-CAS items which form Combat Effectiveness Model components are listed below. The "O" or "C" leading the item number indicates from which survey the items were taken.

Component/Sub-Component	No.	Survey Item
I. Cohesion	C24.	The morale of my work group is high.
	C27.	I feel loyal to others in my group.
	C29.	I will not let my work group down.
	C30.	I trust others within my work group.
	O94.	There is a high spirit of teamwork among my co-workers.
	O102.	My amount of effort compared to the effort of my co-workers, the extent to which my co-workers share the load, and the spirit of teamwork which exists among my co-workers.

Component/Sub-Component	No.	Survey Item
II. Morale (II.A + II.B + II.C + II.D)/4		
A. Job Satisfaction	0101.	The chance to help people and improve their welfare through the performance of of my job. The importance of my job performance to the welfare of others.
	0103.	The recognition of the pride my family has in the work I do.
	0106.	My work schedule; flexibility and regularity of my work schedule; the number of hours I work per week.
	0107.	Job security.
	0108.	The chance to acquire valuable skills in my job which prepare me for future opportunities.
	0109.	My job as a whole.
B. Organizational Climate	082.	Ideas developed by my work group are readily accepted by management personnel above my supervisor.
	083.	My organization provides all the necessary information for me to do my job effectively.
	085.	My work group is usually aware of important events and situations.
	086.	My complaints are aired satisfactorily.
	088.	My organization has a very strong interest in the welfare of its people.
	092.	Personnel in my unit are recognized for outstanding performance.
	098.	My organization rewards individuals based on performance.
C. Pride	032.	To what extent are you proud of your job?

Component/Sub-Component	No.	Survey Item
C. Pride (Cont.)	046.	To what extent does your work give you a feeling of pride?
D. Job Training	C2.	I am satisfied with the technical training (other than OJT) I have received to perform my current job.
	C5.	I am satisfied with the training I receive while on the job.
	C6.	I am confident in the on-the-job training received by my work group.
	C52.	To what extent has your training given you the skills needed to perform your job?
III. Combat Motivation (III.A + III.B + III.C)/3		
A. Military Commitment	C9.	I think I am in very good physical condition.
	C17.	It is <u>important</u> to me personally to have a clear understanding of why my organization must be combat ready.
	C22.	I am usually in good spirits.
	C23.	On the whole, I think that I am well adjusted to Air Force life.
	C35.	I realized my warfighting responsibilities when I joined the Air Force.
	C39.	I can honestly say that I usually put all I have into my Air Force duties.
	C47.	It is important to me personally to be a good soldier.
	090.	I feel responsible to my organization in accomplishing its mission.
	097.	I feel motivated to contribute my best efforts to the mission of my organization.

Component/Sub-Component	No.	Survey Item
B. Combat Mental Set	C19.	If I am sent into a combat situation, I think I'll do all right.
	C20.	I think I'm prepared to be involve in warfare.
C. Combat Training	C50.	To what extent do you feel training drills/exerecises test your organization's combat readiness?
	C51.	To what extent do you feel your organization is combat ready?
	C54.	To what extent do you think your training has prepared you for your potential combat mission?
	C58.	To what extent has your chemical warfare training prepared you for that potential threat?
IV. Leadership	C32.	I think my supervisor is a good leader.
	058.	My supervisor is a good planner.
	059.	My supervisor sets high performance standards.
	060.	My supervisor encourages teamwork.
	062.	My supervisor establishes good work procedures.
	067.	My supervisor asks members for their ideas on task improvements.
	068.	My supervisor explains how my job contributes to the overall mission.
	072.	My supervisor always helps me improve my performance.
	073.	My supervisor insures that I get job related training when needed.
	064.	My supervisor fully explains procedures to each group member.

END
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