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Factors Affecting the Transfer of Basic Combat Skills Training in the U.S. Air Force

THESIS

Rodney E. McCraine, Captain, USAF

AFIT/GLM/ENS/06-09

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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THESIS

Presented to the Faculty

Department of Operational Sciences

Graduate School of Engineering and Management

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Air University

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In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

Rodney E. McCraine, BA, MA

Captain, USAF

March 2006

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Abstract

During Operations ENDURING FREEDOM (OEF) and IRAQI FREEDOM (OIF), many Airmen in support career fields were deployed to hostile environments such Afghanistan and Iraq. Deployments of this nature are a departure from normal U.S. Air Force (USAF) operations where support personnel are normally far from the front lines of battle. The purpose of this research was to understand the factors that affect the transfer of basic combat skills training from the classroom to the battlefield. A 52-item scale measured the perceptions of active duty, USAF officer and enlisted personnel on their ability to transfer the combat skills learned in a classroom to the battlefield.

This research found new relationships with perceived training transfer and provided insight into the factors affecting basic combat skill's training. A new relationship was found between perceived utility of training and perceived training transfer. Additionally, perceptions of training transfer were significantly different when results were analyzed by training type. Overall, perceived training transfer of combat skills seemed most affected by transfer enhancing activities and organizational support for training. The research provided an understanding of the factors affecting combat skills training and provided a foundation for measuring the effectiveness of combat skills training as a single construct made of five separate training types.

AFIT/GLM/ENS/06-09

To my beautiful wife, my strong boys, my little girl, and baby McCraine

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I would first like to thank my Lord and Savior, Jesus Christ. This last 18 months have stretched me spiritually, personally, and professionally beyond what I ever thought I could handle. Without Him, this would have been impossible (Philippians 4:13).

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Rodney E. McCraine

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FACTORS AFFECTING THE TRANSFER OF BASIC COMBAT SKILLS TRAINING IN THE U.S. AIR FORCE

I. Introduction

Overview

The battlefield readiness of U.S. Air Force (USAF) officer and enlisted support personnel depends on an effective training and evaluation of training transfer. In particular, there is a need for understanding the factors that affect the transfer of basic combat skills training from the classroom to the battlefield. Background information concerning the challenges of providing support in a hostile environment, along with the problem statement, purpose, research question, and significance are included in this introductory chapter.

Background

In early 2003, during Operations ENDURING FREEDOM (OEF) and IRAQI FREEDOM (OIF), many Airmen, including those in certain support career fields, were deployed to hostile environments such as Afghanistan and Iraq. Deployments of this nature are a departure from normal USAF operations where support personnel are normally far from the front lines of battle (Hebert, 2004). Air Force Doctrine Document 2-4.1 *Force Protection* states, "Air Force personnel and resources can be used across the range of military operations at the strategic, operational, and tactical levels of war (Department of the Air Force (DAF), 2004a). " Current deployments are placing support Airmen at greater direct risk of

participating in tactical, ground operations (Sturkoll, 2006); thus a renewed emphasis on force protection. According to Major Barry Lineback (1988, pg. 6), “The battlefield makes rigorous physical, psychological, and moral demands that require both tangible and intangible qualities.” Defining and studying the training of basic combat skills is highly important since the use of combat skills is somewhat unique to the U.S. Armed Forces. A Headquarters USAF coordinated white paper titled *Long-Term Integration of Expeditionary Airmen Concepts into the Air Force*, was circulated at the Pentagon questioning whether the USAF is effectively indoctrinating, training, educating, and sustaining combat readiness [for all Support Airmen] over the entire course of their career (Directorate of Security Forces and Force Protection (XOS-F), 2005). To address the issues raised in the white paper, the Expeditionary Combat Airmen Integrated Process Team (ECA IPT) was created by the Directorate of Security Forces and Force Protection (XOS-F, 2005). According to a draft Charter for the ECA IPT, the purpose of the IPT was to "...provide direction to determine current combat skills for the ECA, current training support, the “training gap,” and recommend training and education to close the “gap”" (Headquarters Air Force, Installations , Logistics and Mission Support, Logistics Readiness, Force Management Division (HQ AF/A4RF), 2004).

Problem Statement

According to the USAF Chief of Staff, General T. Michael Mosely, “The things that came out of Corona [an annual meeting of USAF 4-Star Generals] affect everything from basic military training, professional military education, uniforms, etc. These are the things we are focusing on -- our warfighting skills and taking care of our Airmen.” (Weckerlein, 2006) The need for studying combat skills has been acknowledged from the highest levels of the

USAF. However, currently there appears to be no official policy on what skill (or set of skills) constitutes the knowledge or skills all USAF personnel should have to be able to survive and operate in a hostile environment. In addition, there has been no empirical research examining the factors affecting the transfer of combat skills. Consequently, the USAF has offered limited guidance and official organizational direction to train all its' personnel in the area of basic combat skills.

The first step in a training needs analysis is examining the training needs from an organizational perspective (Goldstein, 1993). The study of combat skills training transfer in a USAF context is the first step in an organizational training needs analysis for this type of training. Transfer research has been accomplished examining formal occupational skills training in a USAF context (Dyess, 2003; Hobbs, 2005). However, there has been little research to guide the development of formal USAF combat skills training or to address the factors affecting the transfer of those skills from the classroom to the battlefield.

Purpose Statement and Research Question

This research seeks to aid HQ AF/A4RF in analyzing the set of basic combat skills common across all support career fields and offer improvements and/or additions to current basic combat skills training. The driving question in this research is, "Are USAF Airmen ready to survive in hostile/direct threat environments? " (Yoo, 2004)

Significance of this Study

This study has significance in both the civilian and military training settings. Evaluation of training programs plays a key role in determining their effectiveness for the organization. While research continues to develop alternative ways to measure training effectiveness, some have proposed that measuring training effectiveness alone does not

capture all the important information in the training process since typically only 10% of organizational expenditures result in actual transfer of trained skills back to the job (Georgenson, 1982). Training effectiveness and training transfer are linked in literature and both play vital roles in organizational training success. More specifically, there are factors that affect the abilities of employees to transfer trained skills from the classroom to their work environment. According to a recent literature review in the area of training evaluation, "more cross-fertilization, collaboration, and dialogue among [training evaluation research] disciplines" needs to occur (Salas & Cannon-Bowers, 2001, pg. 490).

From a military perspective, this study seeks to provide a working operational definition of USAF basic combat skills and focus on the perceptions of support Airmen of their ability to transfer the training of those skills from the classroom to the battlefield. Evaluating training in terms of actual results and behavior change is crucial because training combat skills can be a complex task. As such, this study necessitates analyzing those factors which affect the transfer of the diverse set of basic combat skills.

From the civilian perspective, this research seeks to provide valuable insight into the factors affecting training transfer. Specifically, this research will expand transfer literature by offering new relationships with factors affecting perceived training transfer. This research will examine a process (combat skills training) that appears to have little published literature. While combat skills training may be unique to the U.S. Armed Forces, the factors which affect training transfer are not necessarily unique and warrant further study (Facteau, Dobbins, Russell, Ladd, & Kudisch, 1995; Hobbs, 2005).

Summary

Background information was presented concerning current USAF personnel employment in the deployment environment and the need for providing basic combat skills training. In addition, the problem statement expounded on the need for developing and measuring combat skills training using training transfer. This study's purpose is to aid HQ AF/A4RF in examining the factors pertinent to the research question "Are USAF Airmen ready to survive in hostile/direct threat environments?". This study uses several statistical techniques to obtain and analyze the data collected. The significance of this study affects both military and civilian researchers and organizations.

II. Literature Review

Overview

This chapter provides a review of the literature relevant to basic combat skills, training, and training transfer. A review and operational definition of combat skills will be given. Following a brief explanation of each of the specific combat skills, specific literature will be examined in the areas of training, perceived training transfer, pre-training motivation, perceived utility of training, organizational commitment, transfer enhancing activities, organizational support for training, and deployment experience. Based on the review of literature, the research model for the current study will be presented.

Basic Combat Skills

Basic combat skills can best be defined as a collection of skills used to survive and operate on the battlefield. Air Force Instruction (AFI) 36-2201, Volume 1, section 2.4.1.1.4 describes the content of combat skills taught to basic USAF trainees (DAF, 2004b). Among suggested topics listed in the instruction are self-aid and buddy care, anti-terrorism measures, basic field tactics, and security.

Due to an increasing presence in forward locations, USAF officials have been forced to consider how the service is training its' personnel in basic combat skills. In 2003, "Warrior Week" was added to Basic Military Training and included necessary battlefield skills such as law of armed conflict, anti-terrorism techniques, self-aid and buddy care, nuclear, biological and chemical preparedness, weapons training and teamwork (Romano, 2006). In early 2004, certain support career fields were undergoing training and exercises utilizing basic combat skills and convoy operations training (Christenson, 2005). In addition,

basic military training has now taken on the expeditionary mindset of the USAF and has structured its training to match the three phases of a military deployment (a) pre-deployment, (b) deployment, and (c) reconstitution (Romano, 2006).

In the vast amount of training literature, there appeared to be a lack of studies relating to basic combat skills as a single construct. The most closely related work to this study examined andragogical (Knowles, 1984) and pedagogical approaches to teaching basic combat skills to soldiers in the United States Army (Lineback, 1988). This research however, did not define basic combat skills as a single construct (Lineback, 1988). Several other studies focused on specific military tasks (e.g. assembly and disassembly of machine guns) but were only marginally related to combat skills training (Hagman & Rose, 1983; Schendel & Hagman, 1982; Smith & Hagman, 2003). Many training studies involving military samples have tested technical and occupational training (Beck, 2004; Ford, Quinones, Sego, Speer-Sora, 1992; Teachout, Sego, & Ford, 1995; Hobbs, 2005; Lance, Parisi, Bennett, Teachout, Harville, & Wells, 1999.)

Operational Definition of Basic Combat Skills. Commanders determine deployment eligibility using AFI 10-401 (DAF, 2005a) and AFI 10-403 (DAF, 2005b). These and other written policies include five requirements for basic deployment eligibility and their associated timeframes for required training. The five basic requirements for deployment eligibility are (a) primary duty weapon training, (b) Law of Armed Conflict (LOAC) training, (c) Self-Aid Buddy Care (SABC) training, (d) Chemical Warfare Defense training, and (e) Anti-terrorism/Force Protection Level I (AT/FP) training (DAF, 2005b). The requirements for training each of the basic combat skills included in this study will be examined in more detail.

Small Arms Training. Current USAF small arms training for the majority of career fields included in this study consists of training, firing, and qualifying with the 9mm handgun, M4 rifle, or M16A2 rifle. There are three AFI's that apply to USAF small arms training.

The primary role of AFI 36-2226, entitled the *Air Force Combat Arms Program,* is to assign USAF personnel to an *arming group* (DAF, 2003). Arming groups specify the time requirements for how often small arms training must be accomplished to remain qualified. Arming Group A is required to have semi-annual refresher training. Arming Group B is required to have refresher training every 15 months. Arming Group C is required to have refresher training between the 27th and 30th month. The career fields chosen for this study represent each of the arming groups. For example, the Special Investigations and Security Forces career fields are in arming group A, Engineers are in arming group B, and the remainder of the career fields chosen for this study represent arming group C.

While AFI 36-2226 (DAF, 2003) defines the time requirements for training, AFI 36-2227, entitled *Combat Arms Training Program Individual Use Weapons,* outlines the training material to be taught in small arms training (DAF, 2004c). The material is specific and includes a list of general course material to be covered, hours of required instruction, and individual qualification scores.

The primary role AFI 31-207, entitled *Arming and Use of Force by Air Force Personnel,* is to provide an in depth view of small arms use by USAF personnel (DAF, 1999a). This AFI describes how, when, and where USAF personnel should be armed. In addition, it provides a list of the required documents for small arms open and concealed carry by USAF personnel.

Law of Armed Conflict. USAF LOAC training is governed by AFI 51-401 (DAF, 1994). AFI 51-401 (DAF, 1994) delineates responsibilities to different functional areas in the USAF organizational structure. In particular, responsibility for development of the LOAC training program is delegated to the Air Education and Training Command (AETC) (DAF, 1994). AETC is responsible for ensuring, at a minimum, there are three LOAC subjects taught to all USAF personnel at least every 15 months: (a) the 1949 Geneva Conventions for the Protection of War Victims, (b) Hague Convention IV, and (c) respecting the Laws and Customs of War on Land of 1907 (DAF, 1994).

Self-Aid Buddy Care. Requirements for SABC training are outlined in AFI 36-2238 (DAF, 1996). The 24-month requirement for SABC teaches "basic life and limb saving techniques" to non-medical personnel until medical help is available (DAF, 1996).

Chemical Warfare Defense Training. USAF chemical warfare defense training is designed following AFI 10-2501 entitled *Full Spectrum Threat Response (FSTR) Planning And Operations* (DAF, 2002b). AFI 10-2501 covers such topics as disaster preparedness and weapons of mass destruction training (DAF, 2002b). Specifically, training requirements for chemical warfare defense can be found in chapter four of AFI 10-2501 (DAF, 2002b) with practical techniques for operating in chemical environments being found in Air Force Manual (AFMAN) 10-100 (DAF, 2004d).

Anti-terrorism/Force Protection Level I. Training for AT/FP is accomplished using AFI 10-245 (DAF, 2002a) and AFI 31-210 (DAF, 1999b) as guides. The purpose of these instructions is to implement and develop a standard set of AT/FP measures across all USAF installations. The instruction also directs all USAF personnel to comply with the mandatory annual training requirement (DAF, 2002a).

Training

Training can be defined as a planned learning experience designed to bring about a permanent change in an individual's knowledge, attitudes, or skills (Campbell, Dunnette, Lawler, & Weick, 1970 as cited in Noe (1986)). In recent years, many organizations have realized the knowledge base held by their employees can be a key source of sustainable competitive advantage (Elsdon & Iyer, 1999). In 2004 civilian corporations spent $80 billion on formal training programs (Clark & Kwinn, 2005). In 2005, the USAF planned to spend over $9M in basic combat convoy training alone (Yoo, 2006). In addition, new technology creates an increasingly globalized work environment adding new pressures to improve the quality of services and products to stay competitive (Ford, Quinones, Sego, & Sora, 1992). Training has been an essential part of both civilian (Facteau, et al., 1995; Goldstein, 1980; Kirkpatrick, 1976; Yamnill & McLean, 2001) and military organizations throughout the 20th and early 21st centuries (Beck, 2004; Ford, Quinones, Sego, & Sora, 1992; Hagman & Rose, 1983; Hobbs, 2005; Lance et al., 1999).

Training Evaluation: Training Effectiveness versus Training Transfer. Training evaluation can be defined as a "systematic collection of descriptive and judgmental information necessary to make efficient training decisions related to the selection, adoption, value, and modification of various instructional activities" (Goldstein, 1980, pg 237). In 1958 and 1959, D. L. Kirkpatrick released a series of four articles describing his hierarchical model for evaluating training programs (Kirkpatrick, 1996). Kirkpatrick's original model included (a) reaction, (b) learning, (c) behavior, and (d) results. The levels of the model can be summarized as:

1. Reaction: How well the trainee liked the training program.

2. Learning: The knowledge acquired, skills improved, or attitudes changed as a result of training.
3. Behavior: Using those facts and skills learned on the job.
4. Result: Outcomes that appear on the job as a result of training.
(Kirkpatrick, 1996)

Kirkpatrick's model has been the foundational work used by many researchers in training evaluation studies (Alliger & Janek, 1989; Facteau et. al, 1995; Ford & Noe, 1987; Noe, 1986; Noe & Schmitt, 1986; Thayer & Teachout, 1995). However, Kirkpatricks' model included three key assumptions: (a) arranging the hierarchical levels in increasing order of value (i.e., Reaction → Learning → Behavior → Results), (b) causally linking the levels, and (c) positively correlating the levels (Alliger & Janek, 1989). Due to these assumptions, many researchers question the validity of Kirkpatrick's model in accurately evaluating training programs. According to Alliger and Tannenbaum (1996) using Kirkpatrick's model as the standard for training evaluation could actually hinder future research and growth in this arena by suppressing the development of new theories in training research.

Many researchers have attempted to overcome the shortfalls within the Kirkpatrick model by suggesting new models and researching other variables thought to be key factors in the training process (Aliger & Janek, 1989; Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997; Facteau, et al., 1995; Kraiger, Ford, & Salas, 1993; Noe, 1986). Noe (1986), though using Kirkpatricks' model as a framework for his study, suggested there were also motivational and situational factors involved in the training process. Alliger and Janek (1989) suggested expanding the Kirkpatrick model to capture behavioral data from trainees, subordinates, coworkers, and supervisors. Kraiger, Ford, and Salas (1993) noted that variables such as organizational commitment and its effect on learning have largely been ignored. Facteau et al. (1995) attempted to measure training success by using a model that

subsequently showed a significant link between pre-training motivation and perceived training transfer. Alliger et al. (1997) expanded Kirkpatrick's reactions level to include affective and utility reactions and demonstrated a significant link between utility reactions and job performance. Development of new models and ideas has resulted in training evaluation research that has become more complex in determining training effectiveness.

One method used in literature for determining training effectiveness is measuring training transfer. Training transfer can be defined as the ability to apply what one has learned from training back to one's job (Facteau et al., 1995; Hobbs, 2005). The constructs of training effectiveness and training transfer are linked in several studies (Alliger & Janek, 1989; Alliger et al., 1997; Baldwin & Ford, 1988).

When evaluating training, many models use training transfer in combination with other constructs such as pre-training motivation, tests scores from evaluations given at the time of training, and job evaluations scores, to assess training effectiveness (Baldwin & Ford, 1988). According to Hobbs (2005), studies which use the terms training transfer and training effectiveness interchangeably were less common (Facteau et al., 1995; Noe & Schmitt, 1986; Mathieu, Tannenbaum, & Salas, 1992). One study by Gist, Bavetta, and Stevens (1990) suggested training transfer is directly linked to perceptions of training effectiveness. This study found that MBA students with higher perceptions of training transfer were more likely to rate their training as effective (Gist, Bavetta, & Stevens, 1990).

Perceived Training Transfer

The Baldwin and Ford (1988) review of training literature identified three general factors affecting the transfer process and gave future transfer research a clear roadmap. The three factors were (a) trainee characteristics, (b) training design, and (c) work environment.

Trainee characteristics consisted of personality, motivation, and ability factors (Baldwin & Ford, 1988). Training design characteristics incorporated principles of learning (Bass & Vaughan, 1966), sequencing of training (Gagne, 1962), and training content (Campbell, 1971; Ford & Wroten, 1984 as cited in Baldwin & Ford, 1988). Work environment characteristics consisted of support and opportunity to use (Baldwin & Ford, 1988).

Training transfer research is a critical area for training evaluation. Some examples of general types training studied in transfer research following the Baldwin and Ford study include the study of management training (Facteau et al., 1995; Gist et al., 1990; Warr & Bunce, 1995); computer training (Imperial, 2003; Machin & Fogarty, 2003); and technical or occupational skills training (Beck, 2004; Ford, Quinones, Sego, & Sorra, 1992; Hobbs, 2005; Mathieu, Martineau, & Tannenbaum, 1993). Each of these studies has highlighted possibilities for new relationships with training transfer. In the same manner, basic combat skills is a diverse construct consisting of the five separate combat skills listed in the previous section. Analysis of components of the combat skills construct (i.e. weapons training, LOAC training, etc.) may provide some unique insight into the factors affecting combat skills as a whole. As such, the following hypothesis will be tested.

Hypothesis 1. Perceptions of perceived training transfer differ with respect to training type.

During the last decade there have been tremendous theoretical developments in the field of training and training transfer research (Salas & Cannon-Bowers, 2001). The most notable development in training transfer research was the link between individual and situational variables in training transfer such as those in the Facteau et al. (1995) and Mathieu and Martineau (1997) studies (Salas & Cannon-Bowers, 2001). Individual characteristics in this study were defined as the characteristics within an individual that have an influence on

pre-training motivation or perceived training transfer (Mathieu & Martineau, 1997). Situational characteristics were defined as work environment characteristics outside the control of an otherwise capable individual which inhibit or prevent successful completion of a task (Peters & O'Connor, 1980). Facteau et al. (1995) took a wide view of individual characteristics and included influences into career planning, career exploration, and organizational commitment. They expanded the notion of situational characteristics, also called social support for training, and tested the influences of task constraints, subordinate support, supervisor support, peer support, and top management support (Facteau et al., 1995). The conclusions from Facteau et al.'s research was further studies of training transfer were warranted.

Thayer and Teachout (1995) modeled their research based on Kirkpatrick's hierarchical model but also included transfer of training and some of its antecedents. Though pre-training motivation is not included in Thayer and Teachout's (1995) model, studies such as Noe (1986) suggest that learning and motivation are highly related.

Mathieu and Martineau (1997) further expanded on Kirkpatrick's hierarchical model and bore similarities with the Facteau, et al.'s (1995) and Thayer and Teachout's (1995) research. Mathieu and Martineau (1997) renamed and combined Kirkpatrick's levels of reaction, learning, and behavior into a single construct of training outcomes. The behavior element of the training outcomes construct had a similar definition as training transfer as in Facteau, et al. (1995). In addition, Mathieu and Martineau (1997) tested individual and situational characteristics and their relationship to pre-training motivation versus their direct influence on training transfer. Pre-training motivation was defined as the level of motivation to train one has before they attend training (Mathieu & Martineau, 1997). Individual and

situational influences were found to be statistically significant in their strength of the relationship with training outcomes (Mathieu & Martineau, 1997) and warranted further study into the relationship between pre-training motivation and training transfer.

Hobbs (2005) conducted a study based on Facteau et al.'s (1995) research and used a military sample to test the relationship between pre-training motivation and perceived training transfer (2005). Hobbs (2005) research examined the perceptions of training transfer following initial occupational training of USAF Logistics Readiness Officers. Her model examined both individual and situational characteristics and their affect on pre-training motivation and perceived training transfer. One construct included in Hobbs' (2005) model, not included in Facteau et al.'s original model, was transfer enhancing activities from Thayer and Teachout (1995). Transfer enhancing activities proved to be a significant predictor of perceived training transfer in Hobbs' (2005) final model ($\beta = .26$, $p < .001$).

This research is based on previous evaluation and transfer research conducted by Alliger et al. (1997), Facteau et al. (1995), Thayer and Teachout (1995), Mathieu and Martineau (1997), and Hobbs (2005). The six variables this research hypothesizes will predict perceived training transfer and a summary of their background in literature is in listed in Table 1.

Table 1

Construct Relationships to Perceived Training Transfer

Construct	Literature Support
Pre-Training Motivation	Facteau et al. (1995); Hobbs (2005); Mathieu and Martineau (1997)
Perceived Utility of Training	Alliger et al. (1997)
Organizational Commitment	Facteau et al. (1995); Hobbs (2005)
Transfer Enhancing Activities	Hobbs (2005);Thayer & Teachout (1995)
Organizational Support for Training	Facteau et al. (1995); Hobbs (2005)
Deployment Experience	No prior research found.

Based on the relationships between perceived training transfer and the variables listed in Table 1, the following hypothesis was tested.

Hypothesis 2. Hypotheses to support relationships between individual and organizational situational constraints and perceived training transfer.

H2a: An increase in pre-training motivation will result in increased perceptions of training transfer.

H2b: An increase in perceived utility of training will result in increased perceptions of training transfer.

H2c: An increase in organizational commitment will result in increased perceptions of training transfer.

H2d: An increase in organizational support for training will result in increased perceptions of training transfer.

H2e: An increase in the presence of transfer enhancing activities will result in increased perceptions of training transfer.

H2f: An increase in deployment experience will result in increased perceptions of training transfer.

Factors

Previous research demonstrates a clear progression in training transfer research. This research seeks to enlarge and refine the current research by suggesting a model of influences

on the transfer of combat skills training. The specific influences on combat skills training will be discussed in this section.

Pre-training Motivation. Early training studies suggested research in training motivation and its antecedents was necessary (Goldstein, 1980). Pre-training motivation is defined as the extent to which trainees were motivated to attend training and learn from the training prior to attending (Facteau et al., 1995). Many studies have indicated that training motivation is related to training performance (Facteau et al., 1995; Matheiu & Martineau, 1997; Mathieu et al., 1992; Noe & Schmitt, 1986). Baldwin & Karl (1987) showed a significant positive correlation between motivation to learn and subsequent performance in a management course. According to some researchers, motivation may better predict actual transfer of skills back to the job than cognitive ability alone (Colquitt, LePine, & Noe, 2000). These findings have shown motivation to be an important antecedent to training transfer. Colquitt et al. (2000) conducted a recent study showing the need for examining the underlying processes and variables involved in understanding pre-training motivation. In a four month long management program study, Warr and Bunce (1995) looked at junior managers in a British firm. Their findings noted a more significant relationship between pre-training motivation and subsequent learning than many other motivation studies. As a result of their findings, they suggested more research needed to be accomplished on the pre-training motivation of differing types of management training (i.e., specific training course modules) versus management training as a whole to determine if there is a difference in how well motivation predicts future learning (Warr & Bunce, 1995). In line with previous research in civilian organizations, Hobbs (2005) also found a positive relationship between pre-training motivation and perceived training transfer using a military sample.

Perceived Utility. Perceived utility of training can be defined as "an individual's attitude towards the usefulness of training programs" (Ford & Noe, 1987, pg 42). Perceived utility is founded in Expectancy Theory (Vroom, 1964) which suggests trainees will be less motivated to learn if they do not believe the training will enhance their job performance (Clark, Dobbins, & Ladd, 1993). Perceived utility of training has been shown to directly affect pretraining motivation (Clark et al., 1993). Researchers have also found links between perceived utility and job performance (Alliger et al., 1997; Clark et al., 1993). In one study of managers, it was found those who have a positive perception of the training value, are more likely to transfer the acquired skills to the job (Baumgartel, Reynolds, & Pathan, 1984). Utility reactions were shown to better predict transfer of trained skills from the classroom to the job than affective reactions (Alliger et. al, 1997). Perceived utility of training has not been used to predict perceived training transfer in previous studies, it should prove especially valuable in a model of factors affecting basic combat skills training transfer.

Organizational Commitment. It was important early in the literature to make a clear distinction between commitment and motivation as two separate constructs (Scholl, 1980). The organizational commitment construct (Mowday, Porter, & Steers, 1982) was defined as the relative strength of an individual's identification with and involvement in a particular organization. Mowday, Porter, and Steers (1982) linked prior experience with training to heightened organizational commitment. Tannenbaum, Mathieu, Salas, & Cannon-Bowers (1991) noted, "Trainees' organizational commitment levels are likely to predispose them to view training as more or less useful, both to themselves and to the organization. When viewed this way, organizational commitment can be considered as an influence on pre-training motivation" (p. 760). Colquitt et al.'s (2000) review of multiple research studies

agreed with Tannenbaum et al. (1991) and suggested that higher levels of organizational commitment may cause the trainee to view training as useful to themselves and the organization. Facteau et al. (1995) viewed organizational commitment as an influence on pre-training motivation as well as training transfer. Their model found positive relationships between organizational commitment and both pre-training motivation and training transfer ($\beta = .15$, $p < .05$). In Hobbs' (2005) final model, a significant relationship was found between organizational commitment and pre-training motivation ($\beta = .57$, $p < .01$).

Transfer Enhancing Activities. Transfer enhancing activities are another set of variables that can affect the transfer process (Thayer & Teachout, 1995). There are numerous transfer enhancing activities that can be accomplished during training such as overlearning, physical and psychological fidelity, varied practice, teaching of principles, goal setting, principles-meaningfulness, relapse prevention, and self-monitoring (Thayer & Teachout, 1995). Hobbs (2005) used Thayer and Teachout's (1995) original Transfer Enhancing Activities Questionnaire and adapted it to her military sample using feedback cues, principles-meaningfulness, and relapse prevention. In other research, Machin and Fogarty (2003) expanded on the definitions of these three activities:

> Principle-meaningfulness was defined as instruction that attempts to teach higher-order principles and to explain the reasons why things work the way they do. Feedback cues were a form of self-monitoring, wherein learners were taught to be aware of their own performance so that they know whether or not they were doing a task correctly. Relapse prevention training involved helping trainees to recognize situations that they may encounter after training that will hinder or prevent them from doing what they were trained to do. It also included making plans for how to overcome those situations. (Machin & Fogarty, 2003, p. 54, as cited in Hobbs, 2005)

Transfer enhancing activities were found to have a significant relationship to perceived training transfer in the military training study (Hobbs, 2005).

Organizational Support for Training. Organizational support for training is a key element of the transfer process. It has been shown in studies to affect motivation to learn and indirectly affect the transfer process (Noe, 1986). In other transfer research, organizational support has also been called social support (Baldwin & Ford, 1988; Facteau et al., 1995; Hobbs, 2005; Noe, 1986; Noe & Schmitt, 1986). In a study by Facteau et al (1995), social support was separated into top management support, supervisor support, peer support, and subordinate support. Only peer and subordinate support were found related to perceived training transfer. In an attempt to duplicate this portion of the model using a military sample, Hobbs (2005) used the same four social support variables and related them to pre-training motivation and perceived training transfer. The supervisor and subordinate support constructs provided significant relationships ($\beta = .12$, $p < .05$ and $\beta = .30$, $p < .01$ respectively) to perceived training transfer in her study (Hobbs, 2005).

A variable, deployment experience, not previously evaluated in the context of transfer research, was evaluated in this study. Currently, no studies have been found measuring the effect of deployment experience on training effectiveness or training transfer. However, this variable should give some insight to the role actual deployment experience and experience in combat situations plays in the training process.

Proposed Research Model

Based on the hypotheses listed earlier in this chapter, the proposed research model is presented in Figure 1.

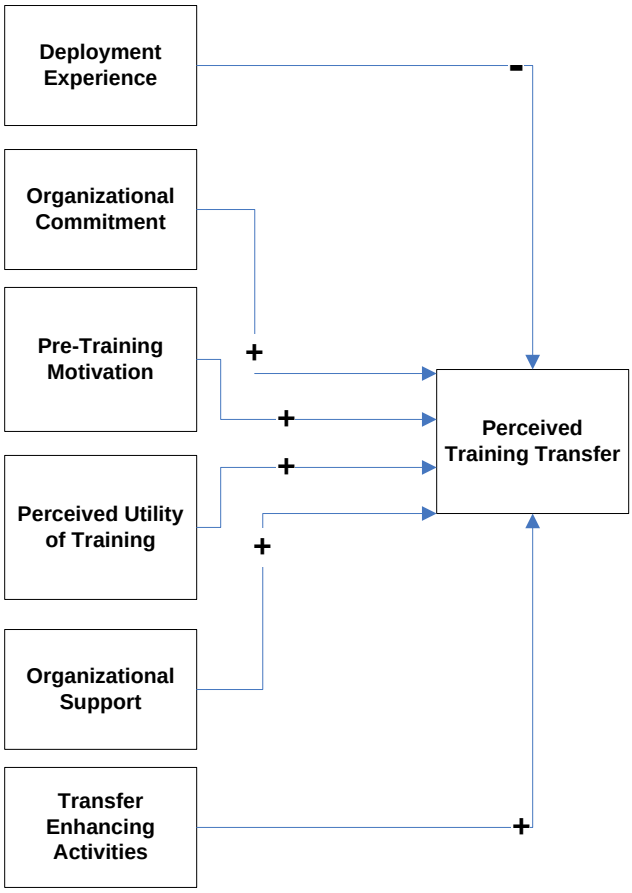

Figure 1. Proposed Research Model Depicting the Influences on Perceived Training Transfer

Summary

Basic combat skills as a single construct has had no official definition in a USAF context. For this study, combat skills was defined as a combination of Anti-terrorism Level I/Force Protection, Self-Aid Buddy Care, Chemical Warfare, Law of Armed Conflict, and Primary Duty Weapons training. D.L. Kirkpatrick (1958, 1959) laid the ground work for evaluating training with his 4- level hierarchical model. Since then, a number of theoretical models have been developed that further explore and refine training transfer and training effectiveness as constructs to give quantifiable models for investigating the usefulness of organizational training. These studies have led to further investigation of the antecedents which influence training transfer or training effectiveness. This research uses primarily

Facteau et al. (1995) and Hobbs' (2005) results to hypothesize and examine the relationships between pre-training motivation, deployment experience, perceived utility of training, organizational commitment, organizational support for training, and transfer enhancing activities on perceived training transfer.

III. Methodology

Overview

This chapter describes the method and analysis used in this study of a variety of influences on training transfer of combat skills. In this chapter, the data collection methods will be followed by a description of the sample and sampling method. Nonresponse bias will be assessed using a wave analysis technique (Armstrong & Overton, 1970). A thorough review of the survey instrument and measure development will conclude this section.

Data Collection Procedures

A list of 6,374 names was received from the Air Force Personnel Center (AFPC) Survey Branch (Datko, 2005). Four personnel were randomly removed from the sample and the remaining total was evenly divided to create five equal groups. Microsoft Excel was used to randomly assign each individual to one specific training type. An e-mail was then sent to each respondent containing a cover letter with an imbedded hyperlink to the survey on 19 December 2005. There were numerous automatic out of office replies sent back due to the Christmas and New Year holidays. A reminder e-mail was sent 4 January 2006 to capture those potential respondents who may have lost the original request in attempts to clean out their Inbox following the holiday period. On 11 January 2006, the survey was removed from the web and data analysis began.

Sample

Initial Sample Review. The targeted population for this study was support active duty USAF officer and enlisted personnel from multiple career fields. The sponsor of this research, HQ AF/A4RF, was interested in specific support career fields (see Tables 2 & 3). As such, the names of the participants provided by the AFPC Survey Branch were based on inputs from the researcher. The sample provided was a stratified, random sample taken of each of the career field's of interest and designed to produce a representative sample with a confidence level of $\alpha = .05$ (Datko, 2005). There were 2,168 useable responses for a total response rate of 34.1%.

Table 2

Enlisted Career Fields Surveyed

Code	Specialty
1N	Intelligence
2F	Fuels
2G	Logistics Plans
2S	Supply
2T	Transportation
3C	Communications
3E	Engineering
3M	Services
3P	Security Forces
3S	Personnel
5J	Paralegal
5R	Chaplain Assistant
6C	Contracting
6F	Finance
7S	Special Investigations

Table 3

Officer Career Fields Surveyed

Code	Specialty
14N	Intelligence
15W	Weather
21A	Aircraft Maintenance
21M	Missle Maintenance
21R	Logistics Readiness
31P	Security Forces
32E	Engineer
33S	Communications
34M	Manpower
35B	Band
35P	Services
36P	Personnel
51J	Judge Advocate
52R	Chaplain
64P	Contracting
65F	Finance
71S	Special Investigations

Demographic Statistics of Survey Respondents. Compared to the USAF demographics for the chosen career fields, the sample respondents had similar demographic characteristics. As age and time in service were correlated so highly in the study ($r = .90$, $p < .01$), only age was used to avoid potential problems with multi-collinearity. This study yielded similar age demographics for officers ($M = 34$) and enlisted ($M = 30$) with the average USAF officer age of 35 years and average enlisted age of 29 years (Air Force Personnel Center, 2004). Gender statistics for the career fields used in this study typically have a mix of 78.6% male and 21.4% female while the respondents in this study were 77.1% and 22.9% respectively (Air Force Personnel Center, 2004).

The rank distribution of the original 6,370 potential respondents was known and this information allowed a detailed comparison of the actual respondents with the original sample. With regards to rank, there were few differences between the original sample and the respondent population. The respondent population contained approximately 59% officers while the initial sample contained approximately 61% officers (see Appendix A). Interestingly, the respondent population had no responses from Airman (E-1) even though the original sample had 64 E-1's. All statistical results are listed in Appendix A

Nonresponse

Respondent nonresponse falls into two categories; inaccessibility and noncompliance (Baruch, 1999). Nonresponse due to inaccessibility refers to participants who could not be contacted to take the survey (e.g. wrong e-mail addresses) (Baruch, 1999). During the notification phase of this survey, 642 e-mails were undeliverable. Several more notifications were returned, however the researcher took a conservative approach and did not count these notifications as delivery failures since the automated systems continued to attempt delivery

for the following five days. Removing the 642 delivery failures from consideration reduced the total available sample size to 5,728 resulting in an effective response rate of 37.8%.

Nonresponse due to noncompliance is more serious since the respondent makes a choice whether or not to respond to the survey based on an unknown reason to the researcher (Baruch, 1999). This type of nonresponse can introduce serious errors due to nonrespondent input possibly being affected by underlying factors that may also have some affect on the data if it were reported (Baruch, 1999). This survey was anonymous, so rigorous tests of nonrespondent attitudes were difficult. As a surrogate, the first 100 cases were chosen from the first wave of notifications for analysis. Literature suggests last responders to a survey instrument are more like nonrespondents than any other group (Armstrong & Overton, 1977; Lindner, Murphy, & Briers, 2001). So, the last 100 cases from the second wave were chosen as a comparison group and means of demographic and survey items for the two groups were tested using an independent samples t-test. No statistical difference was found between the first and last respondent groups in terms of age ($t = 1.66$, $df = 174$, $p < .10$). Analysis of the gender composition between the first and last respondent groups indicated respondents from each wave were comprised of 68 males and 20 females.

The groups appeared to differ on two demographic variables, rank and level of education. In a military sample, these two variables are normally highly correlated since officer commissioning and officer and enlisted promotion are linked to education (Kim, Price, Mueller, & Watson, 1996). The first wave of respondents reported slightly more rank (officer population=62.5%) and were more likely to hold a bachelors degree (40.9%) than the second wave (officer population=48.9%, rank; 31.8% bachelors degree or higher). See Appendix B for complete statistical results.

Instrument Review

Basic Combat Skills. Researching perceived training transfer of basic combat skills as a single construct necessitates the survey of the training attitudes of five distinct skills. In order to accomplish this task, a web based survey was designed for each of the five basic combat skills. Each survey was identical in wording with the exception of the training type (e.g. weapons training, chemical warfare training). Each respondent was randomly assigned to a specific combat skill group and was asked to answer 32 items regarding only that one skill, 13 demographic items, and 2 additional demographic items with optional, unlimited free response capability.

Web-based surveys. Survey research brings many strengths and weaknesses to a researcher. In an information and cost driven society, surveys provide such strengths of lower cost, quick turn around, simplicity, and accurate information flow (Leedy & Ormrod, 2004). In particular, web-based surveys offer some advantages over the traditional "paper and pencil" type survey. Compared to traditional survey's, web-based surveys tend to be more interactive and dynamic (i.e., imbedded logic for branching items) (Dillman, 2000).

To minimize error in the present study, five design principles listed by Dillman (2000, pp. 377-385) were used in this research:

1. Choose for the first item that is likely to be interesting to most respondents, easily answered, and fully visible on the welcome screen of the questionnaire.
2. Present each item in a conventional format similar to that normally used on paper self-administered questionnaires.

3. Restrain the use of color so that figure/ground consistency and readability are maintained, navigational flow is unimpeded, and measurement properties of items are maintained.
4. Avoid differences in the visual appearance of items that result from different screen configurations, operating systems, browsers, partial screen displays, and wrap-around text.
5. Do not require respondents to provide an answer to each item before being allowed to answer any subsequent ones.

The first item was straight forward and asked for the respondents' perception of a particular type of USAF basic combat skills training. In addition, this survey was constructed to allow the respondent to scroll to all items in any particular section of the survey by using the mouse or keyboard. This survey, similar to Hobbs' (2005), was constructed using a common format (i.e., HTML, radio buttons, and unlimited space to write for comments sections) currently in use by other USAF researchers. The survey link was initially sent to several computers both inside and outside the Air Force Institute of Technology firewall to check for appearance issues. To mitigate concerns of reprisal and maintain complete anonymity, no personally identifiable information was requested. Some respondents chose to identify themselves in the comments section or via e-mail to the researcher, so confidentiality was maintained by the researcher reading each of the comments sections and removing any personally identifiable information as well as creating separate, password protected e-mail folders for return e-mails from respondents. A discussion of the pre-testing and pilot testing efforts is discussed below.

Pre-testing and Pilot Testing. The survey instrument was tested on three different

populations as recommended in Dillman (1978). The first test was completed by the research sponsor to review the survey items. The second test was to ask research colleagues to review the instrument and identify any face validity or assumption issues. The first and second tests were completed using the paper-and-pencil versions of the survey. The pilot test was completed using actual potential sample respondents who took the fully deployed web-based version of the survey. The respondents were asked to look at the survey and to identify any unclear or ambiguous items. The respondents were also asked to examine the appearance of the survey and identify any distracting or inappropriate issues. The pilot test was conducted for a 3-day period beginning 1 November 2005. At the conclusion of the test, eight individuals had completed the survey. Pilot study participants were military members in the ranks of Senior Airman to Colonel. At the conclusion of the pilot test, the eight respondents provided significant feedback to the researcher via email resulting in a response rate for the pilot test of 50%.

Survey Modifications. Based on the results of the sponsor related pre-test, the two changes were made to the survey instrument:

1. The education level item from the demographic section had the words "Doctorate" and "Professional" deleted and replaced with "Postgraduate."
2. The item "The time between formal *insert training type here* training classes is too long for me to use it in a hostile environment." was inserted into the Transfer Enhancing Measures section.

Based on the results of the pre-test completed by fellow researchers, four changes were made to the survey instrument:

1. An item was added to the opening screen of the weapons survey asking the respondent to pick M4, M9, or M16 as a primary duty weapon.
2. Several items in the survey initially vacillated between using "deployment environment" and "combat environment." All references to these were changed to read "hostile environment" for consistency.
3. Items three and four of the Transfer Enhancing Activities section were modified to question training program content.
4. The item, "How many times have you been deployed since September 11, 2001?" was added to the demographics section.

The inclusion of a primary duty weapon choice on the opening page of the weapons survey was administrative in nature and allowed the text of the survey to read specifically for the individual respondents' primary duty weapon. An additional advantage of this change allowed the researcher to determine if any difference existed within the levels of small arms instruction (e.g. M4, M9, or M16).

Based on the results of the web-based pilot test, four changes were made to the survey instrument:

1. For the dependent variable, item three was clarified by changing "…my *insert training type here* behavior…" to "…the way I perform *insert training type here*…"
2. The Likert scale on the original web-based version was reading incorrectly. "Slightly Agree" was changed to "Strongly Agree."
3. There were technical problems getting potential respondents to open the survey from the imbedded link. These problems were fixed.

4. Minor grammatical and typographical errors were found and corrected throughout.

General Measure Development Principles

Validity and reliability of measurement items is of utmost importance in survey research. For the purposes of examining survey instruments, two types of validity are important: convergent and discriminant validity (Campbell & Fiske, 1959). Convergent validity is concerned with the scale items being similar within a construct (i.e., converging on the same construct) (Campbell & Fiske, 1959). Discriminant validity measures the opposite and show that measures that should not theoretically be related are in fact not related (Campbell & Fiske, 1959). A measurement is said to be valid only to the extent to which it answers the question it is supposed to answer (Alreck & Settle, 2004). In order to ensure validity, this survey was built using as many existing survey scales as possible (i.e., organizational commitment (Hobbs, 2005).) However, due to the unique nature of this study, some items and scales were developed specifically for use in testing the hypothesized model. Reliability can be defined as the extent to which measures yield consistent results (Leedy & Ormrod, 2005). Reliability will be assessed by using the internal reliability coefficient, Cronbach's alpha. A Cronbach's alpha value of greater than .70 is considered acceptable (Nunnally & Bernstein, 1994).

Survey Measures

The final survey used in this study included 59 items (32 survey items, 15 demographic items, and 2 yes/no items with an area for comments). All construct measurement responses were given using a 5-point, Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (5), with *neutral* (3) as the midpoint. The demographic items

were used to characterize the respondents by different demographic groups such as gender, career fields, and rank. One demographic group in particular, career field, was used to provide the sponsor a reference point concerning the career fields represented in the sample. The yes/no items allowed survey participants to voice any prior combat skills training they had received as well as voice any recommendations for additions to the USAF basic combat skill requirements. All survey items will be listed with individual and scale means and standard deviations in Appendix C. The following section gives a description of how each of the seven constructs was measured and its reported internal consistency coefficient.

Perceived Training Transfer. Perceived training transfer was assessed with a 4-item scale previously used by Hobbs (2005) and based upon a review by Facteau et al. (1995) of the relevant literature (Noe & Schmitt, 1986; Tziner, Haccoun, & Kadish, 1991; Wexley & Baldwin, 1986). Research by Facteau et al. (1995) and Hobbs (2005) found the items to be internally consistent in civilian (α = .87) and military (α = .92) samples, respectively. The reported internal consistency coefficient for this study was a bit lower (α = .72, n = 932) but still within acceptable parameters. The scale mean and standard deviation were 3.42 and .22, respectively.

Pre-training Motivation. Pre-training motivation was assessed with an 8-item scale developed primarily from Facteau et al. (1995) and Hobbs (2005). Facteau et al. (1995) originally administered a 9-item scale for pre-training motivation drawn from several sources (Baldwin & Karl, 1987; Noe & Schmitt, 1986; Hicks & Klimoski, 1987) and reported an internal consistency reliability estimate α = .71. Hobbs (2005) used the same nine items and reported an internal consistency reliability estimate of α = .87 using a military sample. The original nine items were reviewed and four were chosen due to their applicability to a

military population and a study of combat skills. The same four items were asked again using the appropriate specific training type as the subject of the question to assess specific training motivation. The reported internal consistency coefficient for this study was consistent with prior research (α = .82, n = 932) but still within acceptable parameters. The scale mean and standard deviation were 3.63 and 0.38, respectively.

Organizational Support for Training. Organizational support for training was measured using a 4-item scale developed primarily from Facteau et al. (1995) and Hobbs (2005). The original organizational support construct portrayed in the literature had four distinct levels: (a) subordinate support, (b) supervisor support, (c) transfer enhancing activities, and (d) task constraints (Facteau et al., 1995; Hobbs, 2005). In Facteau et al. (1995), only peer and subordinate support was significant, and in Hobb's (2005) only supervisor and subordinate support proved significant. Basic combat skills as a construct consists of five separate skills and former research has shown only marginal significance in this area with other types of training. Since the training of basic combat skills is somewhat different (i.e., this type of training has never been studied before), a scale was developed attempting to view this construct from a higher, aggregate level to provide a starting place for future research in this area. Two perception items were asked for support from immediate supervisors and two from unit level leadership. This is the first time these four scale items have appeared in the same scale together to form an aggregate measure of organizational support for training so there were no reported scale reliabilities to compare the findings. The internal consistency coefficient for this study was within acceptable parameters (α = .78, n = 932). The scale mean and standard deviation were 3.60 and 0.22, respectively.

Transfer Enhancing Activities. Transfer enhancing activities were assessed using an 8-item scale developed from Thayer and Teachout's 17-item Transfer Enhancing Activities Questionnaire (TEAQ) (1995) and Hobbs 17-item scale (2005). Hobb's (2005) found that removing 8 items based on low correlation with the other 11 items, the internal consistency reliability estimate of α = .84 increased to α = .87. This left nine items for the researcher to consider. Two more items were removed due to their perceived non-applicability in measuring basic combat skills. In all, seven items were chosen from the TEAQ and the content was composed of activities which emphasized cues to monitor own performance (self-control cues), relapse prevention, and principles-meaningfulness that occur during training and have influence on training transfer. Two new items were added by the researcher. The first new item added by the researcher was: "The way *insert training type here* training courses are taught make it easy to use the skills in a hostile environment.". The second item added to the transfer enhancing scale was: "The time between formal *insert training type here* training classes is too long for me to use it in a hostile environment." Since most items used were adapted from Hobbs (2005), only slight modifications were made to adjust the type of training from career field specific training to combat skills training. The reported internal consistency coefficient for this study was consistent with prior research (α = .85, n = 932). The scale mean and standard deviation were 3.26 and 0.34, respectively.

Perceived Utility of Training. Perceived utility of training was assessed using a 4-item scale developed specifically for researching the utility of combat skills. Ford & Noe, (1987) developed a similar 5-item scale with a reported internal consistency reliability estimate of α = .87. The reported internal consistency coefficient for this study was slightly

lower (α = .82, n = 932) but still within acceptable parameters. The scale mean and standard deviation were 3.74 and 0.16, respectively.

Organizational Commitment. Organizational commitment was assessed with four items developed by Porter and Smith in their 1970 study (as cited in Facteau et al., 1995). These items were taken from Facteau et al (1995) and modified by Hobbs (2005) to be used in a military environment. Facteau et al. (1995) reported an internal consistency reliability estimate of α = .80 for a civilian sample, while Hobbs (2005) reported an internal consistency reliability estimate of α = .86 for a military sample. The reported internal consistency coefficient for this study was consistent with prior research (α = .84, n = 932). The scale mean and standard deviation were 4.05 and 0.20, respectively.

Deployment Experience. Deployment experience was measured with one item. The Likert scale for deployment experience was different than the other constructs and measured number of deployments. The scale had five possible responses with anchors of "0-1" and "8+" deployments.

The internal consistency coefficients for all five scales were above α = .70. The summary of the Cronbach's alpha's, scale means, and scale standard deviations are reported in Table 4.

Table 4

Scale Reliabilities Summary (n=932)

	Scale α	Scale Mean	Scale SD
Perceived Training Transfer	0.72	3.42	0.22
Pre-training Motivation	0.82	3.63	0.38
Organizational Commitment	0.84	4.05	0.20
Transfer Enhancing Activities	0.85	3.26	0.34
Perceived Utility of Training	0.82	3.74	0.16
Organizational Support for Training	0.78	3.60	0.22

Summary

This chapter described the method used in this study of the influences on training transfer of combat skills. Nonresponse due to noncompliance was assessed and found not to be an issue. This research employed a web-based survey for data collection and received a response rate of 37.8%. Numerous steps were taken to ensure validity and reliability of the survey instrument. Survey measure development was described in detail and internal consistency measurements were acceptable.

IV. Data Analysis and Results

Overview

This chapter will present the results of this study. The two hypotheses will be reported in detail. Hypothesis 1 will be analyzed using ANOVA and hypothesis 2 will be analyzed using linear regression. Finally, regression model results by training type will be presented.

Hypothesis 1

The purpose of Hypothesis 1 was to determine if the reported perceptions of training transfer would differ by individual training type. This hypothesis was analyzed using ANOVA and results indicate partial support (F (4,927) = 6.22, $p < .01$). When grouped by training type, perceptions of training transfer had unequal variances between the groups (Levene's Test Statistic = 10.08, df = 4, 927, $p < .01$), so specific Post Hoc tests were needed to control for this assumption. The Games-Howell (GH) test is one such post-hoc test appropriate for use in large samples where the assumption of homogeneity of variances is violated (Toothacker, 1993). The GH test was used in this sample to determine between which groups the perceptions of transfer were different (see Appendix D).

Table 5

Descriptive Test Results for Perceived Training Transfer by Training Type (n=932)

	N	Mean	Std. Deviation	Range	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Anti-terrorism/Force Protection	172	3.39	0.71	1 - 5	3.28	3.50
Self-Aid Buddy Care	204	3.43	0.65	1 - 5	3.33	3.52
Chemical Warfare	189	3.60	0.61	1 - 5	3.51	3.69
Law of Armed Conflict	174	3.44	0.58	1 - 5	3.36	3.53
Weapons Training	193	3.26	0.80	1 - 5	3.14	3.37
Total	932	3.42	0.68	1 - 5	3.38	3.47

Post hoc testing of the mean perceived training transfer responses described the differences between the training types (see Table 5 and Figure 2). There was a significant mean difference (M.D.) (M.D. = 0.21, $p < .03$) between perceptions of transfer in anti-terrorism/force protection training ($M = 3.39$, $S.D. = 0.71$) and chemical warfare training ($M = 3.60$, $S.D. = 0.61$) as well as a significant difference in means (M.D. = 0.34, $p < .01$) between chemical warfare training and weapons training ($M = 3.26$, $S.D. = 0.80$). No other significant differences were found between training types.

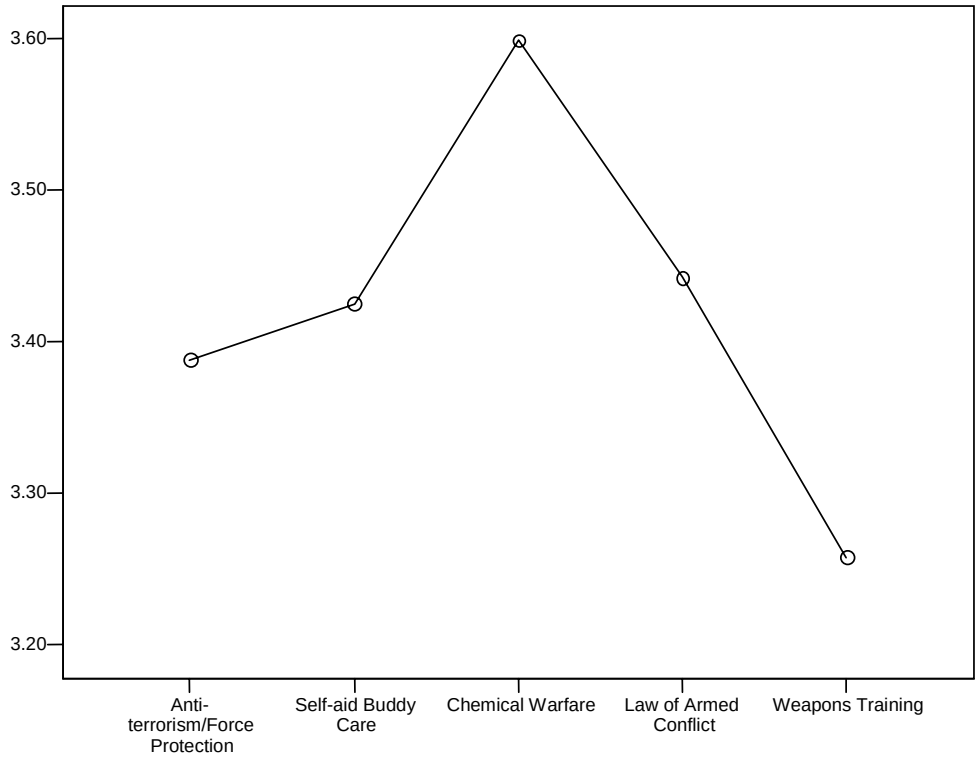

Figure 2. Mean Perceived Training Transfer Responses by Training Type (n=932)

Hypothesis 2

Correlation Analysis. The purpose of Hypothesis 2 was to gain an understanding of the factors affecting the perceived training transfer of basic combat skills. Detailed correlation analysis was the first step in analyzing the interactions between the individual combat skills and how these affected the perceived training transfer of the basic combat skills construct (see Table 6).

Table 6

Inter-item Correlation Matrix (n=932)

	N	M	SD	Range	1	2	3	4	5	6	7	8
1. Age	932	32.72	7.47	19 - 57	1							
2. Perceived Training Transfer	932	3.42	0.68	1 - 5	--	1						
3. Pre-training Motivation	932	3.63	0.53	1 - 5	--	.15(**)	1					
4. Transfer Enhancing Activities	932	3.26	0.65	1 - 5	--	.61(**)	.16(**)	1				
5. Organizational Commitment	932	4.05	0.72	1 - 5	.10(**)	.16(**)	.37(**)	.23(**)	1			
6. Perceived Utility of Training	932	3.74	0.75	1 - 5	.08(*)	.51(**)	.30(**)	.48(**)	.28(**)	1		
7. Organizational Support for Training	932	3.60	0.73	1 - 5	.10(**)	.34(**)	.32(**)	.46(**)	.28(**)	.42(**)	1	
8. Deployment Experience	932	0.34	0.63	0 - 8	.06(a)	--	--	.06(a)	--	--	--	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

a Correlation is significant at the 0.10 level (2-tailed).

The relationship between pre-training motivation and perceived training transfer was significant and positive ($r = .15$, $p < .01$), thus supporting Hypothesis 2a (see Table 5).

The correlation results from Table 5 also support Hypothesis 2b that stated there would be a positive relationship between perceived utility of training and perceived training transfer ($r = .51$, $p < .01$).

The relationship between organizational commitment and perceived training transfer was significant ($r = .16$, $p < .01$) and positive, thus supporting Hypothesis 2c.

Hypothesis 2d was supported as organizational support for training was significantly correlated with perceived training transfer ($r = .34$, $p < .01$).

Correlation analysis supported the proposed positive relationship between transfer enhancing activities and perceived training transfer ($r = .61$, $p < .01$). Given the strength of the correlation, it was necessary to demonstrate discriminant validity (Campbell & Fiske, 1959) between the two variables. As such, a data reduction technique was utilized.

Using principal components analysis (PCA) with an oblique rotation is one way to determine the underlying structure of two variables of interest and establish discriminant validity (Bartholomew, Steele, Moustaki, & Galbraith, 2002). To determine suitability of employing PCA, two tests were used; the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of Sphericity. The items reported a KMO=.87 and $\chi^2 = 5{,}158.57$, $p < .01$, suggesting the data was likely to factor well (Kim & Mueller, 1978). Discriminant validity was demonstrated between perceived training transfer and transfer enhancing activities, as the factor loadings for each variable were consistent with expectations (see Appendix E).

The proposed negative relationship between deployment experience and perceived training transfer was directionally consistent with Hypothesis 2f, but not statistically significant (r = -.001, p < .97).

Hypotheses 2a – 2e tested the prediction that increased pre-training motivation, organizational commitment, perceptions of training utility, perceptions of organizational support for training, and perceptions of transfer enhancing activities, respectively, would increase perceptions of training transfer and were supported by correlation analysis. While correlation analysis provided directional support for Hypothesis 2f, the result was not statistically significant.

Initial Regression Analysis. Further analysis of Hypothesis 2 required use of linear regression. In order to control for experience in the regression model, the researcher added age as a control variable. In most studies, age, rank, and tenure are typically highly correlated (Allen, Russell, Poteet, & Dobbins, 1999). In the current study, age was chosen as a control due to the fact it was a continuous variable and significantly correlated with rank (r = .49, p < .01).

In regression, the manner in which the variables are entered into the model is significant (e.g. stepwise, hierarchical) For this research, the Statistical Package for the Social Sciences, Version 13.0, was used to conduct regression analysis. A stepwise procedure was not utilized in this research since stepwise results can be misleading and are typically used more in an exploratory fashion when there is no prior theoretical reason for entering variables into a model a certain way. In the case of perceived training transfer, there was not a significant amount of research to provide a solid theoretical base the researcher to enter the variables in a certain order. However, some research has been accomplished

suggesting some of the variables in the model may be significant. Initially age was entered into its' own block as a control and each variable was entered simultaneously into the next block.

The regression resulted in a model with two significant predictors, transfer enhancing activities and perceived utility of training, and explained 44.3% of the variance (Adj. R^2 = .443, F (6, 924) = 124.68, $p < .01$). The ANOVA results showed the model had good fit (F (7, 924) = 106.89, $p < .01$). The regression coefficients and statistical output are listed in Appendix E.

There are several diagnostic statistics for determining autocorrelation and collinearity in a regression model. The Durbin-Watson statistic (D-W) is the ratio between the individual error terms and their variance from the mean and is used to diagnose autocorrelation (Mendenhall, Reinhuth, & Beaver, 1993). The reported values of the D-W statistic are between 0 and 4 with desirable values being close to 2 (Mendenhall, Reinhuth, & Beaver, 1993). The second two diagnostic indicators are for diagnosing collinearity. The tolerance is 1 minus R-squared for the regression of that variable on all the other independent variables ignoring the dependent variable while the variance inflation factor (VIF) is simply the reciprocal of the tolerance (Neter, Kutner, Nachtsheim, & Wasserman, 1996). Acceptable data sets should have tolerances greater than .10 and VIF's under ten (Norusis, 2005). The final diagnostic value to examine is the condition index (C-I). To calculate the C-I, the cross-product matrix of the independent variables is computed and factored and the C-I is the summary of the variance which is unaccounted for in the model (Neter et al., 1996). Condition indexes between 15 and 30 are indicative that collinearity may be a problem, but most use 30 as a cutoff (Neter et al., 1996).

The results for this model indicate a low likelihood of issues relating to autocorrelation and collinearity. The Durbin-Watson statistic close to the suggested cutoff of 2 (D-W=1.98); no tolerances were less than .01; variance inflation factors were all under 1.5; and there were no condition indexes over 30 (C-I=28.68). While the diagnostic factors suggested that collinearity was not a significant problem in the model, several beta coefficients had opposite signs than expected. A possible explanation for the oppositely signed beta is negative suppression (Kline, 2005). Suppression occurs when two or more variables are correlated with each other and with the dependent variable (Kline, 2005). In this case, this seems to be a case of negative suppression (Kline, 2005). In negative suppression, an independent variable which is correlated with the dependent variable is acting to suppress the error variance of another independent variable while adding little to the predictability of the dependent variable (Kline, 2005). Finding the suppressor variable(s) can be difficult in more complicated models. The model used in this research was fairly simple so effort was made to revise and build a model in which suppression would not play a large role.

Final Regression Model. Two methods were used for building the final regression model. First, analysis of the part and partial correlations was undertaken in an attempt to understand which variables were sharing variance. Analysis revealed three variables were sharing significant variance in the model; transfer enhancing activities, perceived utility of training, and organizational support for training. The second method was to modify the way the variables were entered into the model. Instead of using simultaneous entry into one block, the variables were entered into separate blocks using a stepwise, hierarchical technique. This technique allowed the researcher to control for shared variance among

variables while controlling the order in which the variables were entered. With lack of established support, the variables were simultaneously entered into blocks from most correlated to least correlated with perceived training transfer. Based on these findings and the high correlation between transfer enhancing activities and perceived training transfer, a model was constructed to reduce the effect of shared variance and attempt to maintain an appropriate model by removing perceived utility and organizational support for training from the model.

The final regression model included only two significant predictors; transfer enhancing activities and pre-training motivation. The revised model accounted for 38.3% of the variance (Adj. R^2 = .383, F (1, 927) = 4.67, p < .04). The ANOVA results indicated the model had reasonable fit (F (1, 928) = 193.64, p < .01). The revised regression model was checked for evidence of autocorrelation and collinearity. The Durbin-Watson statistic was close to the suggested cutoff of 2 (D-W=1.97); all tolerances were above the suggested cutoff of .10; variance inflation factors were all under 10; and there were no condition indexes over 30 (C-I=16.36) suggesting autocorrelation and collinearity were not likely to be issues.

There were mixed results of the hypothesis analyses. Table 7 summarizes the findings from Hypotheses 1 and 2.

Table 7

Hypothesis Summary

Hypothesis Results	
Hypothesis 1	Partially Supported
Hypothesis 2a	Supported
Hypothesis 2b	Supported
Hypothesis 2c	Supported
Hypothesis 2d	Supported
Hypothesis 2e	Supported
Hypothesis 2f	Not Supported

Individual Training Type Regression Models

Hypothesis 2 described the model from an aggregate viewpoint (i.e. with no regard to the contribution of respondents by individual training type). While the aggregate viewpoint is useful for understanding perceptions of training transfer using combat skills as a single construct, the results from Hypotheses 1 and 2 lead to the question of how responses from each training type are affecting the aggregate model. The full data set was segregated by training type and five separate data sets were created. Those data sets were used to build individual regression models predicting perceived training transfer.

Anti-Terrorism/Force Protection Initial Regression. The first regression model built was for those individuals who answered the AT/FP survey. The model including perceived training transfer as the dependent variable and pre-training motivation, perceived utility of training, organizational commitment, organizational support for training, deployment experience, and transfer enhancing activities as independent variables, showed a high adjusted R-square (Adj. R^2 = .487, F (1, 164) = 4.67, p < .01). The ANOVA results showed the model had good fit (F (7, 164) = 24.16, p < .01). The Durbin-Watson statistic was 2.34; all tolerances were above .10; variance inflation factors were all under 10; and the reported condition index was 29.22. The model did not appear to be adversely affected by autocorrelation or collinearity. However, there was another issue with the model. The scatterplot of standardized predicted values versus studentized deleted residuals showed decreasing variance in the model. With these two issues in mind, a second model was tested.

Anti-Terrorism/Force Protection Final Regression. The final model for AT/FP consisted of two significant variables; (a) transfer enhancing activities and (b) deployment experience. This model accounted for 34% of the variance (Adj. R^2 = .34, F (1, 168) =

102.94, $p < .01$) and ANOVA results demonstrated good model fit (F (3, 168) = 35.88, $p <$ .01). The Durbin-Watson statistic was 1.91; all tolerances were over .10; variance inflation factors were all under 10; and the condition index of 15.04 indicated a low likelihood autocorrelation and collinearity adversely affected the model.

Self-Aid Buddy Care Initial Regression. An examination of those respondents replying to the SABC survey yielded a full model which explained 43.4% of the variance (Adj. R^2 = .434, ΔF (1, 196) = 5.78, $p < .02$). The model also demonstrated good fit (F (7, 196) = 23.26, $p < .01$). The Durbin-Watson statistic was 1.94; all tolerances were over .10; variance inflation factors were all under 10; and the condition index of 28.75 signaled the model did not appear to be adversely affected by autocorrelation or collinearity. Some beta coefficients had opposite signs than predicted so a second model was tested.

Self-Aid Buddy Care Final Regression. The revised model for SABC consisted of two significant variables; (a) transfer enhancing activities and (b) deployment experience. This model explained 34% of the variance (Adj. R^2 = .34, ΔF (1, 200) = 5.49, $p < .02$) and ANOVA results demonstrated good fit (F (3, 200) = 35.88, $p < .01$). The Durbin-Watson statistic was 1.91; all tolerances were over .10; variance inflation factors were all under 10; and the condition index was 15.04.

Chemical Warfare Initial Regression. The results for the full regression model using chemical warfare as the training type were similar to the aggregate model. The model resulted in an Adj. R^2 = .38, ΔF (1, 181) = 2.85, $p < .09$, and ANOVA results indicate good fit (F (7, 181) = 17.63, $p < .01$). The chemical warfare training model for was assessed for autocorrelation and collinearity issues. The Durbin-Watson statistic was 1.97; all tolerances were all above .10; variance inflation factors were all under 10; and the reported condition

index was 28.65. The model appeared to be free of autocorrelation and collinearity. Some beta coefficients had opposite signs than predicted so a second model was tested.

Chemical Warfare Final Regression. The revised model for chemical warfare training consisted of two significant variables; (a) perceived utility of training and (b) organizational support for training. This model explained 12.6% of the variance (Adj. R^2 = .126, ΔF (1, 185) = 13.62, $p < .01$) and ANOVA results indicated good fit (F (3, 185) = 3.23, $p < .01$). The Durbin-Watson statistic was 1.97; all tolerances were over .01; variance inflation factors were all under 10; and the condition index was 17.11.

Law of Armed Conflict Initial Regression. The responses for LOAC training produced similar regression models to the other individual training types. The adjusted R-square was .36 (ΔF (1, 170) = 11.47, $p < .01$) and this model also seemed to have good fit (F (7, 166) = 14.08, $p < .01$). The Durbin-Watson statistic was a little lower than the other models (D-W=1.95) but still appropriate. All tolerances were over .10 and variance inflation factors were all under 10. However, the condition indexes for the final model were over 30 (C-I=30.99) suggesting collinearity was a significant factor, so a second model was tested.

Law of Armed Conflict Final Regression. The revised LOAC model consisted of two significant factors; (a) transfer enhancing activities and (b) pre-training motivation. The total variance explained by these two factors was 32.9% (Adj. R^2 = .329, ΔF (1, 170) = 5.88, $p <$ .03). The revised model also demonstrated appropriate fit (F (3, 170) = 29.23, $p < .01$). Autocorrelation and collinearity did not appear to be problems in the revised model. The Durbin-Watson statistic was 1.91; the VIF's were all under 10; tolerances were all above .10; and the condition index was 22.24.

Primary Duty Weapon Training Initial Regression. The regression model for respondents answering the weapons training survey was more predictive than the AT/FP model. The adjusted R-square was .50 (ΔF (1, 189) = 32.91, $p < .01$) and this model also showed good fit (F (7, 185) = 17.63, $p < .01$). The Durbin-Watson statistic was a little lower than the other models (D-W=1.80). All tolerances were above .10 and variance inflation factors were all under 10. However, the condition indexes for the final model were over 30 (C-I=31.44) suggesting collinearity was a significant factor. A second model for weapons training was tested.

Primary Duty Weapon Training Final Regression. The final weapons training regression model consisted of three significant factors; (a) transfer enhancing activities, (b) perceived utility of training, and (c) deployment experience. The final model explained 50.1% of the variance (Adj. R^2 = .501, ΔF (1, 188) = 30.80, $p < .01$). An ANOVA indicated the final model was significant in explaining variance (F (4, 188) = 49.26, $p < .01$). The diagnostic indicators suggest the revised model appeared to be free of autocorrelation and collinearity. The Durbin-Watson statistic was 1.83; all tolerances were above.10; variance inflation factors were all under 10; and the condition index was 6.39.

The result of the individual training type regression models indicated that the same factors were not significant in every model. The significant factors for training type regression model are summarized in Table 8.

Table 8

Individual Training Type Significant Regression Factors

Training Type	Significant Factors in Revised Regression Model
Anti-Terrorism/Force Protection	Transfer Enhancing Activities Organizational Commitment
Self-aid Buddy Care	Transfer Enhancing Activities Deployment Experience
Chemical Warfare	Perceived Utility of Training Organizational Support for Training
Law of Armed Conflict	Transfer Enhancing Activities Pre-training Motivation
Primary Duty Weapon	Transfer Enhancing Activities Perceived Utility of Training

Summary

This chapter presented the results of this study. Analysis of variance was used to determine there were differences in perceived training transfer of chemical warfare training with anti-terrorism training as well as with primary duty weapons training.

Correlation analysis was used to determine the relationship between pre-training motivation, perceived utility of training, transfer enhancing activities, organizational commitment, organizational support for training, and deployment experience with perceived training transfer. There was a significant correlation between transfer enhancing activities and perceived training transfer. A data reduction technique, PCA with Oblimin rotation, was utilized to establish discriminant validity between perceived training transfer and transfer enhancing activities. The final regression model revealed a significant amount of variance was explained in predicting perceived training transfer by including transfer enhancing activities and organizational support for training. In addition, the regression models for each training type indicated all factors did not equally affect all training types.

V. Conclusion

Overview

This study sought training perceptions of USAF officer and enlisted support personnel with regards to basic combat skills training. These perceptions highlighted the noticeable gaps in basic combat skills training. In the process of completing this study there were some general recommendations that can be made with regards to the structure of basic combat skills policies and training in the USAF. In addition, there are some specific recommendations about the conduct of the training itself. This research sought to also provide an initial framework for studying basic combat skills as a single construct. As such, there are some implications for future research and some limitations to this study.

Discussion

Hypothesis 1. Hypothesis 1 sought to determine if there were differences in responses based on the specific training type of the survey taken. There were three groups that differed in the results. Participants who took the chemical warfare training survey had the highest average response to perceived training transfer and were significantly different from both weapons training (the lowest perceived training transfer response) and AT/FP training. This could be due to several factors. This survey sought to only survey people on their attitudes about the formal training class without respect to practical experience. However, many respondents may have allowed their experiences and practice in chemical warfare training during Operational Readiness Inspections (ORI) and Exercises (ORE) to bias their responses. This could explain the large difference between weapons training and chemical warfare training. During ORI's and ORE's, both chemical warfare skills and

AT/FP skills are tested in a realistic environment. This explanation by itself does not explain the difference between chemical warfare training and AT/FP training though. Another possible explanation for this difference could be simply the way the training is taught. Unlike AT/FP, chemical warfare training is taught using multiple methods. There is normally a classroom lecture component, sometimes a video component, and in most cases participants actually have to don the full chemical ensemble. The hypothesis was only partially supported since there were no differences between the remaining training types.

Hypothesis 2. Hypothesis 2 attempted to provide a more comprehensive model of the relationships between the independent variables and perceived training transfer. The final model indicated transfer enhancing activities and organizational support for training to significantly explain variance in perceived training transfer. Hobbs (2005) found a significant path in her final structural equation model demonstrating a strong link between transfer enhancing activities and perceived training transfer. The findings from this research validated the link Hobbs found between transfer enhancing activities and perceived training transfer.

Organizational support for training showed top level and immediate supervisor support for training were significant predictors of perceived training transfer. This finding partially replicates Hobb's (2005), who found a significant relationship between supervisor support and perceived training transfer but was inconsistent with Facteau et al. (1995).

The four variables found to have insignificant in the revised regression model were pre-training motivation, perceived utility of training, organizational commitment, and deployment experience.

Pre-training motivation was not a significant predictor of perceived training transfer. This finding mirrors the results found in previous military studies (Hobbs, 2005) and conflicts with research in civilian studies (Facteau, et al., 1995). One possible explanation for the pre-training motivation construct being insignificant in this study is because combat skill's training is mandatory for all USAF personnel. The definition of compliance is the extent to which training was taken because it was mandated by the organization (Facteau et al., 1995). Previous research has shown mixed results in how compliance affects pre-training motivation (Hicks & Klimoski, 1987; Hobbs, 2005).

Perceived utility of training was found to be a significant predictor of perceived training transfer. This finding represented a new relationship in transfer research. However, due to potential problems with suppression due to the high correlation between perceived utility of training, transfer enhancing activities, and perceived training transfer, this construct was left out of the final regression model.

Organizational commitment failed to show significance in predicting perceived training transfer. This finding was consistent with Facteau et al's., (1995) research and Hobb's (2005) findings. Instead, these studies indicated a significant link between pre-training motivation and organizational commitment.

There was no prior research to provide a comparison with the deployment experience results. The results are somewhat surprising as one would think deployment experience would affect an individual's view of the training they have received either for better or worse.

Limitations

As was the case in previous research (i.e. Facteau et al., 1995), suppressor effects may have been present in the regression model. According to Facteau et al. (1995), in order for suppression to occur, a certain degree of collinearity must be present in the model. In particular, transfer enhancing activities, perceived utility of training, and organizational support for training were all intercorrelated at high levels ($r > .45$).

Another potential limitation to the research, common method bias, is common to most behavioral research. Common method bias occurs when one method (e.g. survey research) is used to study multiple latent or unobserved variables (Podsakoff & Organ, 1986). One particular source of common method bias in this study could be from the participants trying to provide socially acceptable responses (Podsakoff & Organ, 1986). Combat skills training is a "hot topic" right now in military settings and in particular the USAF setting so this may have influenced some participants responses. According to the Air Force Chief of Staff, General Mosely, "The things that came out of Corona [an annual meeting of Air Force 4-Star Generals] affect everything from basic military training, professional military education, uniforms, etc. These are the things we are focusing on -- our warfighting skills and taking care of our Airmen." (Weckerlein, 2006) Beyond the actual responses to the survey, there were also some structural issues with the survey instrument.

There were also potential limitations to the scales used in this study. In particular, a single-item scale was used to assess deployment experience. The format of the scale made it impossible to discern how many individuals have never deployed and how many have deployed once. The deployment experience scale was designed so the respondent chose the same option for zero or one deployment. The reduced fidelity of the responses to the item

made it difficult to distinguish between those who have deployed only once and those who have never deployed. In addition, the responses on this scale showed excessive kurtosis and significant skew in the direction of "deployed 0-1 times". In order to make conclusions about the affect deployment experience has on perceived training transfer, more individuals need to be surveyed with greater than three deployments. In combination, these two effects may have had an impact on the relationship of deployment experience with perceived training transfer. Future research should revise the scale for this item and attempt to balance the distribution of respondents on the deployment experience scale.

Implications for the U.S. Air Force

General Recommendations. The USAF currently has no standard definition of what constitutes a "basic combat skill" (HQ AF/A4RF, 2004). The most comprehensive guide to the USAF combat skills program would have to be AFMAN 10-100 *The Airman's Manual* (DAF, 2004d). Based on the responses to the open ended items on the survey this research is built on, the *Airman's Manual* (2004) falls short of clearly defining the skills and knowledge one would need to have to effectively operate in a hostile environment. The *Airman's Manual* (2004) leaves out some of the skills and knowledge USAF members see as important such as movement with weapons and small group leadership. Perhaps the USAF should consider revising the manual to be more like the Army's Soldier's Manual of Common Tasks (Department of the Army, 2003). This regulation contains all basic combat skills required to be an Army soldier regardless of Military Occupational Specialty and requires that all soldiers are certified in each skill prior to graduation of basic training. In addition, it provides detailed instructions of how to complete each task. Part of the difficulty in defining

basic combat skills for this research was lack of a single point of contact or responsible organization for the training of all basic combat skills.

Central oversight of all training programs ensures the Instructional System Development (ISD) model is adhered to and training is kept relevant to the current environment. Most USAF training programs follow the training model set forth in AFMAN 36-2234 *Instructional System Development* (DAF, 1993). The ISD allows training programs (i.e., Basic Communications Officer Training, Basic Logistics Readiness Officer Training, Basic Military Training, etc.) to follow a rigorous educational analysis, design, development, and implementation process (Figure 7). The key factor in this diagram is to realize training evaluation is at the heart of the model and is a continuous process throughout each phase.

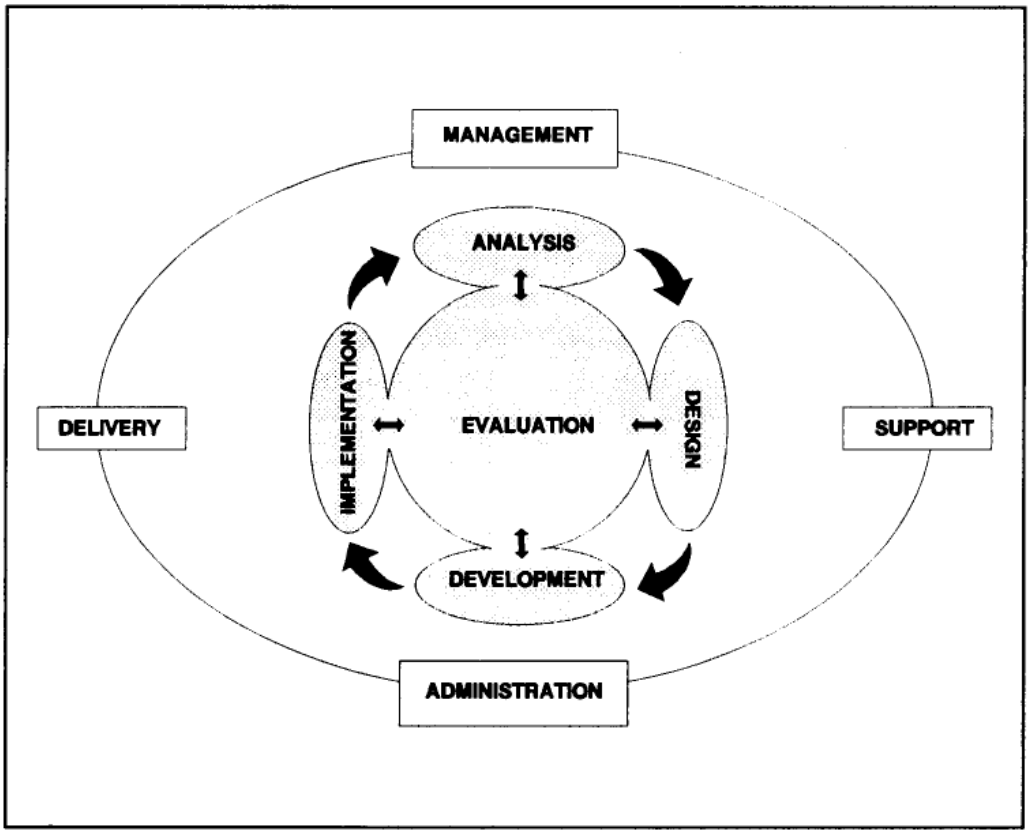

Figure 7. ISD Model with Phases (1993)

Basic combat skills training within the USAF is not managed by a single responsible organization. Instead, it relies on numerous AFI's, Headquarters directives, Major Command directives, base level leadership, base and unit deployment manager's interpretations, and to a great extent, locally developed training additions attempting to make the training more applicable to the current world environment. To complicate matters further, the AFIs that define our basic combat skills come from four separate instruction series; Security Forces, Personnel, Operations, and Civil Engineering. Perhaps a single AFI listing all the basic combat skills should be drafted and a single organization should be responsible for maintaining its currency. Since relevant training is the key, one potential recommendation would be the organization which analyzes, designs, develops, and implements a unified combat skills training curriculum should reside in Air Education and Training Command.

A significant factor in the training evaluation process from a strategic view, is to have some metric for determining if a particular type of training is effective. Return on Investment (ROI) is one empirical way to measure training. In a federal government context, ROI can be very useful human resource management tool, "since many of its agencies are mission oriented, but their organizational goals are not necessarily captured as cost savings or profit." (Chmielewski & Phillips, 2002, pg. 2) Simply stated, ROI is the net benefit of a program (Total Benefits minus Total Costs), divided by the Total Program Costs, multiplied by 100 (Chmielewski & Phillips, 2002; Wang, Dou, & Li, 2002).

$$ROI = ((TotalBenefits - TotalCosts) / TotalCosts) * 100$$

The training of basic combat skills could be measured using ROI. During the course of this study, the researcher sought information about the amount of money spent on basic combat skills. It appears the USAF does not currently have a system in place to methodically track

expenses of this type. In the process of developing a basic combat skills training program based on the ISD model, a program should also be developed for accurately accounting for the costs (and benefits) of the program.

*Specific Training Recommendations. S*pecific recommendations regarding future combat skills training should be examined in light of the results of the revised aggregate regression model in this study. The model demonstrated two primary areas of interest for future basic combat skills training: transfer enhancing activities and organizational support for training.

The most significant factor in predicting how well USAF members felt they could use the skills in a hostile environment was the presence of transfer enhancing activities. What this means for the USAF is the need to take a theoretical approach to building and refining the basic combat skills training program. When building and refining these training courses, the material needs to include such learning principles as overlearning, physical and psychological fidelity, varied practice, teaching of principles, goal setting, principles-meaningfulness, relapse prevention, and self-monitoring (Thayer & Teachout, 1995). Weapons training may be a good place to begin incorporating some of these transfer enhancing activities.

The Army and Marines use a system by MPRI © 2005 called the Laser Marksmanship Training System (LMTS) to:

> "support (a) the training of marksmanship fundamentals (ie., steady position, aiming, breath control and trigger squeeze), shot grouping, weapon zeroing practice, and simulated record fire evaluation, (b) competency-based exercise delivery where LMTS-based pre-testing is used to predict which soldiers need training (i.e., unlikely live-fire qualifiers) and post-testing is used to signal when enough such training has been provided (i.e., once live-k qualification becomes likely), and (c) use of LMTS-based testing to validate live-fire qualification status when range facilities are not readily available." (Smith & Hagman, 2003).

Several alternatives are available for using LMTS or a similar system to provide more realistic weapons training with the presence of transfer enhancing activities. One alternative is the USAF could "share" some of the LMTS systems with the Army or Marines and promote joint training and exercises using the system. Another alternative could be for the USAF to purchase LMTS (or similar) systems and train its own personnel to provide "organic" training ability. These options for weapons training are only a few examples of how incorporating transfer enhancing activities into combat skills training could be accomplished. While the presence of such transfer enhancing principles is necessary in the training of basic combat skills, the regression model showed that other variables were involved in increasing perceived training transfer.

In order for training to be effective, this study showed that an individual's organization needs to truly support the training. While it is important to track the number of individuals being trained, perhaps it is equally or more important to track and assess actual learning to support the development of better programs from the unit level.

One way this can be accomplished is to re-emphasize the types of training those in the field need most to base-level and senior leaders. This survey offered a section for individual respondents to list the types of training they thought the USAF needed to consider "a basic combat skill". There were several themes listed throughout the survey responses; enhanced primary duty weapon training, joint focused training, survival training, relevant training materials, and team training.

Common Themes to Open-ended Item

There were two open-ended items in the survey. Many respondents (56%) provided comments regarding what should be considered a basic combat skill. The common themes from that item are summarized and comments provided in the next five sections.

Enhanced Primary Duty Weapons Training. Many participants in the survey had strong opinions regarding weapons training. Most respondents who provided comments mentioned weapons training was not being conducted frequently enough. Other respondents noted that the weapons training USAF members currently receive does not align with actual situations in which one would have to employ the use of force. Several personnel noted learning how to shoot and move were vital skills not currently being taught. Here are two examples of respondent comments:

> "Current training only addresses how the weapon works and how to aim/fire but doesn't address situations where Airman might be forced to use weapons in combat zones…"

> "M-16 and M-9 training, all ranks, once a year, include moving targets."

Joint Focused Training. Several respondents used the state of current deployments to support their notion we need more joint training. Some respondents said all Airmen should learn to be infantryman first like their Army and Marine Corps counterparts. Others took a milder approach and suggested Airmen need to have a better conceptual view of the different services and how they work together. Here are two examples of respondent comments:

> "As we continue to shape our forces we also continue to deploy into joint enviorments; therefore, our focus should lend some way of integrating and/or increasing contingency skills training with other military components."

> "More Joint combat training based on deployment with Joint Services."

Survival Training. The topic of survival training spanned a much broader scope than simple attendance of the USAF Survival School at Fairchild Air Force Base. Several respondents felt this should be a required course for all Airmen regardless of AFSC. Others supported the current structure with more opportunities for those deploying to hostile areas to attend the survival school. In addition to formal survival training, several participants recommended all Airmen be taught basic hand-to-hand combat skills (i.e. rifle fighting, knife fighting, and unarmed defense such as martial arts.) Critical language training was also listed by several respondents as a necessary survival skill. Here are three examples of respondent comments:

> "Basic Survival skills, Quality Self-Aid Buddy care. Before deployment, emphasis in Code of Conduct and SERE."
>
> "Recognition techniques to tell the difference between friendly and hostile foreign nationals. Realistic survival/resistance training for everyone (not just aircrew)."
>
> "…survival training for multiple environments."

Relevant Material. Numerous participants in the study lamented that current USAF training is not relevant to the environments and locations to which they are deploying. Most commented on the relevance of current weapons training, but there were several others who commented on the other types of training as well. Anti-terrorism/Force Protection training was said to be relevant for temporary duty assignments to places like the Thailand, but not to hostile areas like Iraq. Self-Aid Buddy care was also thought to be inadequate for use in a hostile environment. Several respondents mentioned the Army's Combat Life Saver course as an alternate possibility for incorporation into USAF basic combat skills training. Here are three examples of respondent comments:

> "More hands on training and in mock hostile environment…"

> "…intensive courses in…air base defense tactics and small arms tactics would be highly beneficial in deployed environments."

Hands on Training. Many comments were made about the way different types of USAF basic combat skills training is conducted. Many simply said computer based training was not enough. Others noted that computer based training with hands on experience would be better. Some respondents have never had any hands on combat skill's training in areas like chemical warfare or weapons training. In addition, several respondents made the comment that USAF personnel should "train like they fight" by implementing more realistic scenarios. Here are two examples of respondent comments:

> "…APPLY the skills rather than just read them during CBT or talking about them in classroom/seminar."

> "We need more hands on weapons training and role playing in a combat enviroment that will involve war games with these situations with LOAC integrated in them to help prepare us."

Team Training. Respondents who discussed team training noted two primary issues. First, there were several participants who recommended using teams to conduct weapons training. Learning how to move in teams while under fire is one area mentioned. In addition, general training in teamwork, group dynamics, and small group leadership were also listed as possible candidates to be added to the basic combat skills list. Here are three examples of respondent comments:

> "Internal Base defense, small team tactics, fire and manuever, manuever under fire, enhanced small-arms firing practice, threat recognition and reporting"

> "Real distance firing, squad/fireteam based integrated fire exercises, basic urban fighting skills, shoot/move training"

> "[I] Believe every airman an infrantryman (like Marines/Army). [USAF personnel] Need basic infrantry skills, individual and team methods, basic Air Base Defense."

Numerous other comments were made but limited space prevents them from being including in this section. Additional comments are provided in Appendix F.

Implications for Future Research

There are several key areas that are important for future research. First, a model could be developed and survey responses tested using some form of confirmatory factor analysis or path analysis using popular software such as LISREL (Jöreskog & Sörbom, 1979). The high correlations between the independent variables and previous research (Facteau et al., 1995; Hobbs, 2005) suggested there could be some underlying relationships between the independent variables. Building a structural equations model could help determine the direction and strength of these relationships.

A second direction future research could take would be to refine the survey instrument used in this study. A refined survey could be used to attempt to replicate the findings or uncover new variables affecting perceived training transfer from both the aggregate and specific training levels. Specifically, deployment experience did not show significance in predicting perceived training transfer in the aggregate model. If a study were completed incorporating a different scale for deployments or on a population with a higher deployment rate, perhaps a more accurate picture of the relationship could be determined. New relationships could also be tested using this instrument. The survey was built in such a manner that it could be administered using any number of different training types as subjects. While this research defined basic combat skills as an aggregate of five different training types, other research could be done using different combinations of training.

Finally, future research should be accomplished using a more empirical approach to determining training effectiveness. While perceived training transfer is useful from the perspective of understanding the attitudes of the respondent population, a more empirical approach using actual performance before and after training may be useful in making informed decisions at the operational and tactical levels. More research should be accomplished in the area of measuring training effectiveness from the highest levels of the USAF as well. While performance oriented measures may be appropriate for operational and tactical levels, a measurement such as ROI could be highly beneficial to senior leaders in the USAF from the strategic perspective.

The driving question in this research, "Are Air Force Airmen ready to survive in hostile/direct threat environments?," was asked by Chief of Staff of the Air Force, General John J. Jumper (Yoo, 2004). It is difficult to answer this question based on the survey responses alone since 70% of respondents were neutral in their sense of perceived training transfer. Analysis of individual training types provided some insight into the attitudes USAF personnel had in regards to basic combat skills training. It appears USAF personnel in general are more comfortable with using chemical warfare skills than any other type of combat skill. In contrast, it appears USAF personnel are least comfortable utilizing their primary duty weapons in a hostile environment.

The comments section highlighted some possible explanations for the differing attitudes toward individual training types. Respondents often compared current combat skills training with current mission taskings. While most of the feedback indicated significant change is needed, many found the training to be adequate for certain environments. In particular, it appears many respondents do not perceive high utility in chemical warfare

training. By way of contrast, current weapons training was often mentioned as highly useful, but lacking in alignment with current operations.

This research has highlighted the gaps in current combat skills training many USAF personnel perceive to exist based on their experiences in locations like Baghdad and Bagram. Though the training may not provide USAF personnel with 100% of the training they need, the respondents to this research have shown they are committed to the organization and that is the first step in closing the training gaps.

Summary

This study sought training perceptions of USAF officer and enlisted support personnel with regards to basic combat skills training. The perceptions of the respondents suggested there are gaps in combat skills training. The presence of transfer enhancing activities, pre-training motivation, and organizational support for training significantly explained variance in a regression model predicting perceived training transfer. Some limitations to the study included correlation among independent and dependent variables, common method bias, limitations within the scales used in the survey instrument, and limitations to the measurement of the dependent variable. The general recommendations made with regards to the structure of basic combat skills policies and training in the USAF include, (a) defining what types of training should be considered "basic" combat skills, (b) centralizing responsibility for development, and (c) development and implementation of future combat skills training courses under AETC. In addition, specific recommendations about the conduct of the training itself were to better develop specific training programs to include transfer enhancing activities and increase organizational support for training. Future

research should seek to better measure training effectiveness in the area of combat skills and control for some of the limitations in this study.

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Appendix A: Demographic Analysis

Gender

Table A1

Gender Summary for the Survey Respondent Population

Group	N	Percent	Cumulative Percent
Male	1,632	75.3	75.3
Female	485	22.4	97.7
Missing	51	2.4	100.0
Total	2,168	100.0	

Appendix A: Demographic Analysis

Education

Table A2

Educational Information for the Survey Respondent Population

Education Level	N	Percent	Cumulative Percent
High School	102	4.7	4.7
Some College	423	19.5	24.2
Associates	218	10.1	34.3
Bachelors	641	29.6	63.9
Masters	617	28.5	92.4
Post Graduate	131	6.0	98.4
Missing	36	1.6	100.0
Total	2,168	100.0	

Appendix A: Demographic Analysis

Rank

Table A3

Rank Structure for Total Initial Sample Provided By the Air Force Personnel Center (n=6,370)

Rank	N	Percent	Cumulative Percent
Airman Basic	17	.3	.3
Airman	64	1.0	1.3
Airman First Class	611	9.6	10.9
Senior Airman	648	10.2	21.0
Staff Sergeant	880	13.8	34.9
Technical Sergeant	571	9.0	43.8
Master Sergeant	300	4.7	48.5
Senior Master Sergeant	55	.9	49.4
Chief Master Sergeant	22	.3	49.7
Second Lieutenant	361	5.7	55.4
First Lieutenant	620	9.7	65.1
Captain	1074	16.9	82.0
Major	580	9.1	91.1
Lieutenant Colonel	356	5.6	96.7
Colonel	105	1.6	98.3
Special Agent	106	1.7	100.0
Total	6370	100.0	

Appendix A: Demographic Analysis

Table A4

Rank Structure of Respondent Sample Population (n=2,168)

	N	Percent	Cumulative Percent
Airman Basic	4	.1	.1
Airman First Class	113	5	5.1
Senior Airman	134	6.2	11.3
Staff Sergeant	231	10.7	22.0
Technical Sergeant	203	9.4	31.4
Master Sergeant	112	5.2	36.6
Senior Master Sergeant	25	1.2	37.8
Chief Master Sergeant	13	.5	38.3
Second Lieutenant	144	6.6	44.9
First Lieutenant	211	9.7	54.6
Captain	416	19.2	73.8
Major	251	11.6	85.4
Lieutenant Colonel	167	7.8	93.2
Colonel	44	2.0	95.2
Special Agent	54	2.6	97.8
Missing	46	2.2	100.0
Total	2,168	100.0	

Appendix B: Nonresponse Analysis Tables

Age Comparison

Table B1

Descriptive Comparison of Respondent and Nonrespondent Age (N=176)

Group	N	M	S.D.
Wave 1	88	33.93	.89
Wave 2	88	31.91	.84
Total	176	100.0	

Appendix B: Nonresponse Analysis Tables

Table B2

Means Test of Respondent and Nonrespondent Groups (N=176)

	Levenes Test		Independent Samples t-test		
Age	F	Sig*	t	df	Sig.*
	.006	.937	1.66	174	.10

*Two-tailed significance level

Appendix B: Nonresponse Analysis Tables

Gender Comparison

Table B3

Gender Frequency Analysis for Wave 1 (n=88)

Group	n	Percent	Cumulative Percent
Male	68	77.3	77.3
Female	20	22.7	100.0
Total	88	100.0	

Appendix B: Nonresponse Analysis Tables

Table B4

Gender Frequency Analysis for Wave 2 (n=88)

Group	n	Percent	Cumulative Percent
Male	68	77.3	77.3
Female	20	22.7	100.0
Total	88	100.0	

Appendix B: Nonresponse Analysis Tables

Rank Comparison

Table B5

Rank Frequency Analysis for Wave 1 (n=88)

	n	Percent	Cumulative Percent
Airman Basic	1	1.1	1.1
Airman First Class	4	4.5	5.6
Senior Airman	3	3.4	9.0
Staff Sergeant	5	5.7	14.7
Technical Sergeant	7	8.0	22.7
Master Sergeant	4	4.5	27.2
Senior Master Sergeant	0	0.0	27.2
Chief Master Sergeant	0	0.0	27.2
Second Lieutenant	9	10.2	37.9
First Lieutenant	16	18.2	55.6
Captain	14	15.9	71.5
Major	11	12.5	84.0
Lieutenant Colonel	8	9.1	93.1
Colonel	6	6.9	100.0
Total	88	100.0	

Appendix B: Nonresponse Analysis Tables

Table B6

Rank Frequency Analysis for Wave 2 (n=88)

	n	Percent	Cumulative Percent
Airman First Class	8	9.1	9.1
Senior Airman	13	14.8	23.9
Staff Sergeant	7	8.0	31.9
Technical Sergeant	10	11.4	43.3
Master Sergeant	5	5.7	49.0
Senior Master Sergeant	0	4.5	49.0
Chief Master Sergeant	0	0.0	49.0
Second Lieutenant	2	2.3	51.3
First Lieutenant	8	9.1	60.4
Captain	20	22.7	83.1
Major	8	9.1	92.2
Lieutenant Colonel	6	6.8	99.0
Colonel	1	1.0	100.0
Total	88	100.0	

Appendix B: Nonresponse Analysis Tables

Education Comparison

Table B6

Education Frequency Analysis for Wave 1 (n=88)

Education Level	n	Percent	Cumulative Percent
High School	2	2.3	2.3
Some College	15	17.0	19.3
Associates	5	5.7	25.0
Bachelors	30	34.1	59.1
Masters	27	30.7	89.8
Post Graduate	9	10.2	100.0
Total	88	100.0	

Appendix B: Nonresponse Analysis Tables

Table B6

Education Frequency Analysis for Wave 2 (n=88)

Education Level	n	Percent	Cumulative Percent
High School	6	6.8	6.8
Some College	23	26.2	33.0
Associates	4	4.5	37.5
Bachelors	27	30.7	68.2
Masters	24	27.3	95.5
Post Graduate	4	4.5	100.0
Total	88	100.0	

Appendix C: Individual Scale Item Reliability and Statistics

Scale Item Summary

Table C1

Perceived Training Transfer Scale Summary

Item	α	M*	SD
Perceived Training Transfer	.72	3.42	0.22
Based on the formal skills training received in *insert training type* courses, I feel I could perform the skills effectively in a hostile environment.		3.59	1.00
I am not able to transfer the skills learned in *insert training type* formal training courses to a hostile environment. (R)		3.61	1.00
I have changed the way I perform *insert training type* in order to be consistent with material taught in the formal *insert training type* training course.		3.16	0.81
My actual *insert training type* performance has improved due to the skills that I learned in the *insert training type* formal training course.		3.33	0.90

*Range = 1 (Strongly Disagree) - 5 (Strongly Agree)
n=932
(R) Indicates reverse coded item

Appendix C: Individual Scale Item Reliability and Statistics

Table C2

Pre-training Motivation Scale Summary

Item	α	M*	SD
Pre-training Motivation	.82	3.63	0.38
If I have trouble understanding the material presented in a training program, I try harder.		3.89	0.83
I get more out of training programs than most of my peers.		3.21	0.72
I look forward to actively participating in training programs.		3.57	0.92
Doing well in training programs is important to me.		4.16	0.64
If I have trouble understanding the material presented in a formal *insert training type* training course, I try harder.		3.78	0.81
I get more out of formal *insert training type* training courses than most of my peers.		3.12	0.70
I look forward to actively participating in formal *insert training type* training courses.		3.34	0.98
Doing well in formal *insert training type* training courses is important to me.		4.00	0.74

*Range = 1 (Strongly Disagree) - 5 (Strongly Agree)
n=932

Appendix C: Individual Scale Item Reliability and Statistics

Table C3

Organizational Commitment Scale Summary

Item	α	M*	SD
Organizational Commitment	.84	4.05	0.20
I am willing to put in a great deal of effort beyond that normally expected in order to help the Air Force be successful.		4.27	0.66
I "talk up" the Air Force to my friends as a great organization to work for.		4.04	0.92
I find that my values and the Air Force's values are very similar.		4.13	0.84
For me, the Air Force is the best of all possible organizations to work for.		3.78	1.07

*Range = 1 (Strongly Disagree) - 5 (Strongly Agree)
n=932

Appendix C: Individual Scale Item Reliability and Statistics

Table C4

Transfer Enhancing Activities Scale Summary

Item	α	M*	SD
Transfer Enhancing Activities	.85	3.26	0.34
During formal *insert training type* training courses I have taken, the instructors explained why things worked the way they did.		3.65	0.81
During formal *insert training type* training courses I have taken, the instructor(s)/computer based training explained why it was necessary to do things a certain way.		3.64	0.78
The content of the *insert training type* training really made things clear as to why things worked the way they did.		3.61	0.79
The course material for *insert training type* training really emphasized how to recognize my mistakes as I made them.		3.23	0.97
During *insert training type* training, we talked about situations that might prevent us from using our new skills and ways to deal with those situations.		3.05	0.99
During *insert training type* training, we talked about how to develop good work habits, so we would remember what we were taught in a hostile situation.		2.99	1.01
The way *insert training type* training courses are taught make it easy to use the skills in a hostile environment.**		3.14	0.97
The time between formal *insert training type* training classes is too long for me to use in a hostile environment **(R).		2.76	1.09

*Range = 1 (Strongly Disagree) - 5 (Strongly Agree)
**Indicates new item
n=932
(R) Indicates item is reverse scored

Appendix C: Individual Scale Item Reliability and Statistics

Table C5

Perceived Utility of Training Scale Summary

Item	α	M*	SD
Perceived Utility of Training	.82	3.74	0.16
Insert training type training will affect my ability to survive and operate in a hostile environment.		3.89	0.89
The training I received in *insert raining type* is relevant in a hostile environment.		3.82	0.93
I find *insert raining type* skills training useful in hostile environments.		3.73	0.89
The content of *insert raining type* training courses is appropriate for situations encountered in a hostile environment.		3.51	1.00

*Range = 1 (Strongly Disagree) - 5 (Strongly Agree)
n=932

Appendix C: Individual Scale Item Reliability and Statistics

Table C6

Organizational Support for Training Scale Summary

Item	α	M*	SD
Organizational Support for Training	.78	3.60	0.22
My supervisor believes that *insert training type* training is important and s/he attends relevant courses.		3.71	0.81
If a last minute work center crisis arose, my supervisor would still allow me to attend *insert training type* training as scheduled.		3.31	1.11
The benefits of *insert training type* training courses are highly valued by my unit.		3.56	0.92
The requirement for individuals to attend *insert training type* training courses are widely supported in my unit.		3.82	0.86

*Range = 1 (Strongly Disagree) - 5 (Strongly Agree)
n=932

Appendix D: Hypothesis 1 Results

Table D1

Analysis of Variance of Perceived Training Transfer by Training Type

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.414	4	2.853	6.223	.000
Within Groups	425.072	927	.459		
Total	436.485	931			

Appendix D: Hypothesis 1 Results

Table D2

Games-Howell Post Hoc Test Results for Perceived Training Transfer

Training Comparisons		M.D.	Std. Error	Sig.
Anti-Terrorism/ Force Protection	Self-Aid Buddy Care	-.04	.07	.99
	Chemical Warfare	-.21(*)	.07	.03
	Law of Armed Conflict	-.05	.07	.95
	Weapons	.13	.08	.47
Self-Aid Buddy Care	Anti-Terrorism/ Force Protection	.04	.07	.99
	Chemical Warfare	-.17	.06	.06
	Law of Armed Conflict	-.02	.06	.99
	Weapons	.17	.07	.16
Chemical Warfare	Anti-Terrorism/ Force Protection	.21(*)	.07	.03
	Self-Aid Buddy Care	.17	.06	.06
	Law of Armed Conflict	.16	.06	.10
	Weapons	.34(*)	.07	.01
Law of Armed Conflict	Anti-Terrorism/ Force Protection	.05	.07	.94
	Self-Aid Buddy Care	.02	.06	.99
	Chemical Warfare	-.16	.06	.10
	Weapons	.18	.07	.09
Weapons	Anti-Terrorism/ Force Protection	-.13	.08	.47
	Self-Aid Buddy Care	-.16	.07	.16
	Chemical Warfare	-.34(*)	.07	.01
	Law of Armed Conflict	-.18	.07	.09

* The mean difference is significant at the .05 level.

Appendix E: Hypothesis 2 Results

Factor Analysis

Table E1

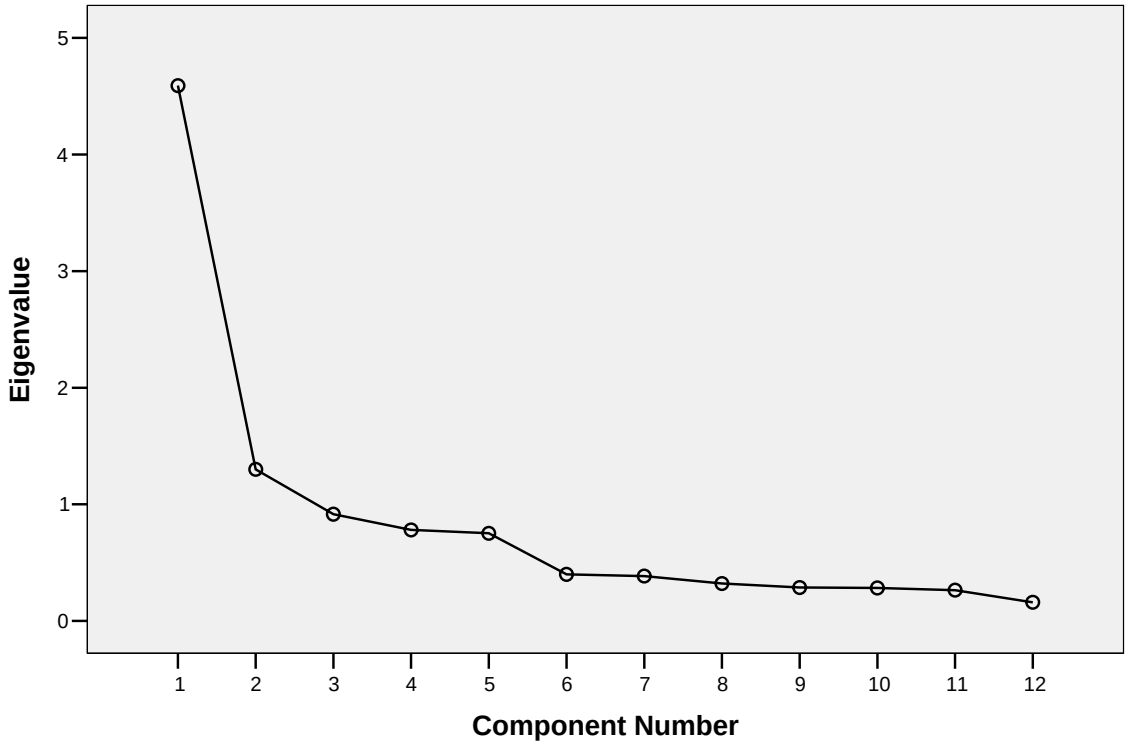
Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity for Perceived Training Transfer and Transfer Enhancing Activities

	KMO	X^2	df	Sig.
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.87			
Bartletts Test of Sphericity		5,158.57	66	.000

Appendix E: Hypothesis 2 Results

Figure E1

Perceived Training Transfer and Transfer Enhancing Activities Scree Plot



Appendix E: Hypothesis 2 Results

Table E2

Factor Pattern Matrix

	Raw Component			Rescaled Component		
	1	2	3	1	2	3
Perceived Training Transfer (Q1)			.802			.802
Perceived Training Transfer RECODE (Q2)			.803			.803
Perceived Training Transfer (Q3)			.340			.420
Perceived Training Transfer (Q4)			.586			.650
Transfer Enhancing Activities (Q1)	.436			.535		
Transfer Enhancing Activities (Q2)	.416			.533		
Transfer Enhancing Activities (Q3)	.482			.609		
Transfer Enhancing Activities (Q4)	.709			.734		
Transfer Enhancing Activities (Q5)	.927			.937		
Transfer Enhancing Activities (Q6)	.950			.939		
Transfer Enhancing Activities (Q7)	.615			.636		
Transfer Enhancing Activities RECODE (Q8)		-.987			-.903	

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Appendix E: Hypothesis 2 Results

Table E3

Component Correlation Matrix

Component	1	2	3
1	1.000	.023	.506
2	.023	1.000	.005
3	.506	.005	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Appendix E: Hypothesis 2 Results

Control Variable Correlations

Table E4

Correlations Between Age, Rank, and Time in Service

Scale	N	M	SD	1	2	3
1. Age	932	32.72	7.47	1		
2. Rank	932	11.02	7.12	.49(**)	1	
3. Time in Service	932	8.36	3.62	.90(**)	.33(**)	1

** Correlation is significant at the 0.01 level (2-tailed).

Appendix E: Hypothesis 2 Results

Initial Model Regression Analysis

Table E5

Model Summary

Model	R^2	Adj. R^2	Change Statistics ΔF	df1	df2	Sig. ΔF	Durbin Watson
1. Age	.00	.00	.00	1	930	.76	
2. Age, Pre-training Motivation, Deployment Experience, Transfer Enhancing Activities, Organizational Commitment, Organizational Support, Perceived Utility	.45	.44	1.66	6	924	.00	1.98

Appendix E: Hypothesis 2 Results

Table E6

Model Fit (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.043	1	.043	.091	.762[a]
	Residual	436.442	930	.469		
	Total	436.485	931			
2	Regression	195.307	7	27.901	106.894	.000[b]
	Residual	241.178	924	.261		
	Total	436.485	931			

a. Predictors: (Constant), Age

b. Predictors: (Constant), Age, Pre-training Motivation, Deployment Experience, Transfer Enhancing Activities, Organizational Commitment, Organizational Support for Training, Perceived Utility of Training

Appendix E: Hypothesis 2 Results

Table E7

Combat Skills Regression Model Coefficients

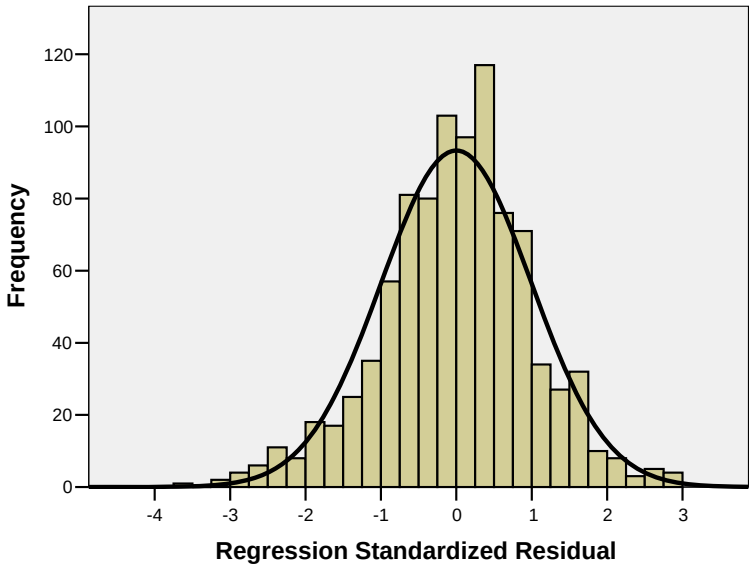
	Variable	B	SE B	β
1.	Age	0.00	0.00	.01
2.	Age	0.00	0.00	-.03
	Pre-training Motivation	-.01	.04	0.00
	Transfer Enhancing Activities	.51	.03	.48*
	Organizational Commitment	-.02	.03	-.02
	Perceived Utility of Training	.27	.03	.30*
	Organizational Support for Training	.01	.03	.01
	Deployment Experience	-.04	.03	-.04

* Significant to $\alpha = .01$

Appendix E: Hypothesis 2 Results

Figure E2

Residual Plot



Appendix E: Hypothesis 2 Results

Revised Model Regression Analysis

Table E6

Model Summary

Model		R^2	Adj. R^2	Change Statistics ΔF	df1	df2	Sig. ΔF	Durbin Watson
1.	Age	.00	.00	.09	1	930	.76	
2.	Age, Transfer Enhancing Activities	.38	.38	569.91	1	929	.00	1.96
3.	Age, Transfer Enhancing Activities, Pre-training Motivation	.38	.38	4.50	1	928	.04	.

Appendix E: Hypothesis 2 Results

Table E7

Model Fit (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.043	1	.043	.091	.762[a]
	Residual	436.442	930	.469		
	Total	436.485	931			
2	Regression	165.984	2	82.992	285.026	.000[b]
	Residual	270.501	929	.291		
	Total	436.485	931			
3	Regression	168.044	3	56.015	193.643	.000[c]
	Residual	268.441	928	.289		
	Total	436.485	931			

a. Predictors: (Constant), Age

b. Predictors: (Constant), Age, Transfer Enhancing Activities

c. Predictors: (Constant), Age, Pre-training Motivation, Deployment Experience, Transfer Enhancing Activities, Organizational Commitment, Organizational Support for Training, Perceived Utility of Training

Appendix E: Hypothesis 2 Results

Table E8

Combat Skills Regression Coefficients

	Variable	B	SE B	β
1.	Age	0.00	0.00	0.01
2.	Age	0.00	0.00	-0.03
	Transfer Enhancing Activities	0.65	0.03	0.62*
3.	Age	0.00	0.00	-0.02
	Transfer Enhancing Activities	0.64	0.03	0.61*
	Pre-training Motivation	0.07	0.03	0.06**

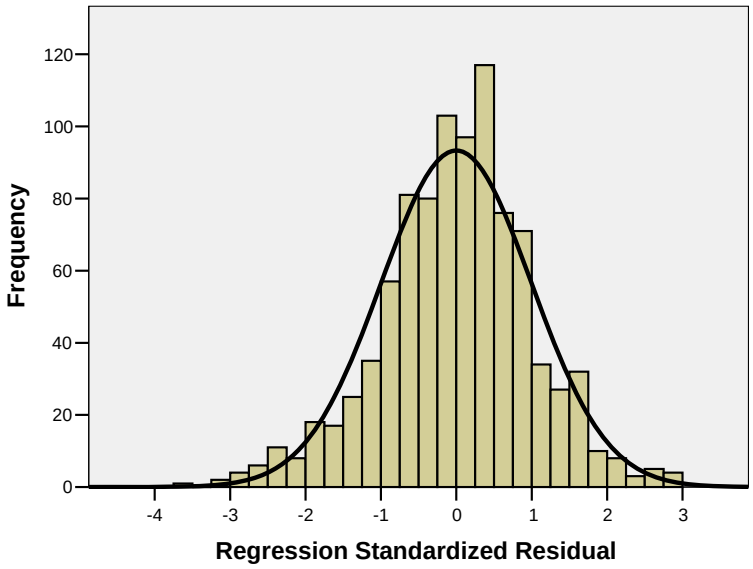
* Significant to $\alpha = .01$

** Significant to $\alpha = .05$

Appendix E: Hypothesis 2 Results

Figure E3

Residual Plot



Appendix F: Comments from the Survey

Rank	AFSC	Gender	Survey Type	Comments
Capt	14N3	Male	Self-Aid Buddy Care	- Actual "combat" skills (i.e. hand-to-hand combat, etc.) - Weapons familiarization/training on an annual basis - Army field communication skills (how to operate one) All Airmen should be test/evaluated for profeciency on the above trainings on an annual basis along with the annual PT test cycle. As more and more AF personnel are being deployed to perform tasks/functions that are considered Army functions(i.e. convoy duty, convoy security, foot patrols, prisoner handling, etc.) these additional combat skills are critical.
Maj	14N	Male	M9	- Advanced weapons training - countersurveillance / Force Protections skills - Defensive/tactical driving - Urban environment hostage situations - Small unit tactics
MSgt	2F0X1	Male	Chemical Warfare	- Convoy, Personal/Base Defense, Familiarization with weapons other then M-16/M-9
LtCol	64P4	Male	Anti-Terrorism Force Protection	- Field skills - airmen are very likely these days to find themselves operating (eating, sleeping, hygiene, handling weapons, performing primary duties) in field conditions. Soldiers call these basic soldiering skills, and every soldier is confident operating in the field. Airman should be afforded the opportunity to gain the same confidence.
Capt	21A	Male	Anti-Terrorism Force Protection	- Firearms qualification more than once every 2 years for both M-16 and M-9, regardless of enlisted/officer rank. - Recognition techniques to tell the difference between friendly and hostile foreign nationals. - Realistic survival/resistance training for everyone (not just aircrew). - Flightline (or applicable work area) asset protection techniques.
Capt	15W3	Male	Self-Aid Buddy Care	- Frequent (every 6 months) requalification on M-9 and M-16 - Small unit ground combat tactics; 2 week course per calendar year - Perimeter security tactics; post-attack UXO recon and reporting
TSgt	1N0X1	Male	Chemical Warfare	- Less focus on chem warfare - The last 4 armed conflicts we have participated in did not involve the use of CBRN attacks, yet we had to carry all the CBRN defense gear, and recieve an inordinately large amount of Chem Warfare training. - More focus on actual combat skills, and employment of those skills. - Prior to deploying to Iraq I recieved minimal firearms, attack response and conventional warfare training. This would have been much more usefull than the enormous amount of chem warfare training I recieved that was never employed.
Capt	15W3	Male	Chemical Warfare	- M-16 and M-9 training, all ranks, once a year, include moving targets. - Chem Decontamination processing once each year. - ATSO/CERE Exercise once each year. -- Using sim Mark IV kits in crisis situation. -- Deploying, reading chem alerts (M8/M9 paper) during crisis. -- Driving in MOPP IV. - Ground navigation (GPS and/or map and compass), HMMWV driving, outdoor survival skills.
TSgt	2S0x1	Male	Chemical Warfare	- More familiarization with your primary weapon. During exercises, individuals manning the ECP of facilities should be armed. - AEF 9 personnel recently received Expeditionary Combat Skills Training. Maybe this should be a recurring training instead of just before deployment.

Appendix F: Comments from the Survey

Maj	14N3	Male	Law of Armed Conflict	"Basic combat skills" should entail more than the theoretical application of LOAC principles. It should also teach practical skills one can expect to employ in a combat situation. Firing an M-9 or M-16 at a paper target every one to two years is not sufficient training for Airmen who could potentially be placed in a combat zone and assigned to convoy or patrol duty. In my own experience, when I deployed to an air base in Iraq I turned in my M-9 at the armory when I walked off the plane, and picked it up 3 months later as I was departing. Thankfully, I was never placed in a situation where I needed to have it on my hip, but if I had been, I couldn't escape the feeling that I lacked a level of training on par with my Army counterparts to employ that weapon in a combat situation. I recommend all personnel deploying to Iraq receive Urban Combat training prior to their deployment. This training should include such basic skills as carrying the weapon, low-crawling with it, and especially firing and reloading in full gear (helmet, body armor, etc) vice doing so in a sterile firing line environment in just your BDUs.
Capt	14N	Male	Law of Armed Conflict	1)Basic level of hand to hand combat for self confidence and self defense 2)Scenario training on leadership in morally ambiguous situations 3)Counseling on coping with death and possibly losing lives of those under your command or with whom you work
Maj	14N4	Male	M9	1)CATM training needs two components: annual and proficiency. There is too much basic familiarization in the annual component--there should be oppprtunities to fire the M-9 to build proficiency throughout the year instead of 80 shots every 18 months. 2) All deployers should qualify on M-4 and M-9. The likelihood of going outside the wire in Afghanistan and Iraq is high; every deployer needs to be able to defend himself--and his peers--in case of ambush. 3) Air Base Ground Defense. The Army is not always going to be around to conduct base defense. We should all be familiar with the principles and basic tactics involved in defending our positions and materiel.
LtCol	C21A3	Male	Self-Aid Buddy Care	1. AF SABC training Video WAY outdated 2. Weapons Proficency a near Joke...properly resource CATM to train MORE frequently. Lowering the bar with longer intervals in not the answer.
A1C	6fx03	Male	Law of Armed Conflict	1. Basic hand to hand combat 2. In order for USAF members (especially first term airman) to remember the rules and engage in the rules of Law of Armed Conflict, there has to be consistency in the training. Training classes are good, but like every training class one can only remember so much info. The key to success in this is to provide those who aren't familiar with the Law of Armed Conflict, real world questions and scenarios where they can apply the information. To keep the training fresh and to remember information and rules, training and the end of each or every other month could help members install in their minds the Information needed to correctly engage in Law of Armed Conflict.

Appendix F: Comments from the Survey

1Lt	33S	Male	Anti-Terrorism Force Protection	1. Evasion techniques 2. More frequent weapons qualification training 3. Survival techniques
Maj	14N	Male	Anti-Terrorism Force Protection	1. M4 rifle, M9 pistol, AND SHOTGUN, need to be taught, and tested annually. Need to ensure that all personnel have access to weapons, ammo and range time to maintain qualification. 2. AT/FP training is too sexy. Need more stuff on how to install deadbolts on doors, check cars for bombs, and avoid/escape riot situations. 3. Need more OPSEC training, so people don't put valuable info on blogs and websites.
MSgt	1N5X1	Male	M16	1. More frequent arms training. 2. Urban warfare training.
TSgt	1N3X4G	Male	Law of Armed Conflict	1. More frequent weapons training 2. Basic SERE training 3. Training in POW/hostage situation survival techniques
SrA	3C0X2	Male	Chemical Warfare	1. More in-depth weapons training. I don't know ANYTHING about being in combat 2. Something to fill the need above
MSgt	6C071	Male	Self-Aid Buddy Care	1. Self-aid and Buddy Care at least semi-annuallly 2. More ground defense training 3. Weapons (M-16, 9M) training more than once every 30 months or atleats within 45 days prior to depolyment.
A1C	1N5	Male	Chemical Warfare	1. Weapons Training 2. Field Training 3. Emergency Situation, HAZMAT training
Maj	33S3	Male	Anti-Terrorism Force Protection	1.) Air Force personnel should be issued a weapon about a week into Basic officer and enlisted training and they should be required to maintain it through out the training. 2.) Air Force personnel should have to qualify on weapon(s) annually. 3.) Performance reports show contain weapons qualification status. 4.) Need realistic MOPP (chem gear) training, where individuals are required to wear it for 24-48 hours straight.
1Lt	15W3	Male	Law of Armed Conflict	A basic course in combat operations likely to be experianced at a deployed airfield. Also, some time will all small arm types (M-9, M-4, M-16 and the AR-249) to include proper use and effective firing techniques of these weapons. This should be standard for all members regaurdless if you are Enlisted or Officer.
SSgt	6C0X1	Male	M16	A course in urban tactics. Close Quarter Combat.
2Lt	14N3	Male	Self-Aid Buddy Care	a Deployment briefing of the threats you will enounter at the location you are deploying to.

Appendix F: Comments from the Survey

A1C	2T2	Male	Chemical Warfare	A longer time in the Deployment exercises than already allowed. It would be more beneficial if that training was focused on more.
1Lt	15W3	Male	Chemical Warfare	A more rigorous chem warfare training system is needed. I received a chem warfare training session at OTS, and must use the AFMAN 10-100 (Airman's Manual) to refresh myself on procedures. It shouldn't just be mandated for deployments, it should be Force-wide. Not all career fields deploy, but chem warfare training should still be important to all.
Col	21R	Male	Anti-Terrorism Force Protection	A short, pre-deployment practical exercise with appropriate lessons (e.g., mortar attack, convoy attack, travel protections such as hotel check-in and car rental, etc...) would be a useful way to APPLY the skills rather than just read them during CBT or talking about them in classroom/seminar.
Maj	33s	Male	Law of Armed Conflict	a) Basic Combat Skill is more than just LOAC. b) The AF must change its culture to one of a a more combat-centered attitude.
2Lt	64P	Male	Self-Aid Buddy Care	Absolutely!!! Firearms training on a regular basis (m16, m249 etc), not only for SOME deployed areas, mortar attack/rocket attack training, DFP building training, live action drills using weapons against experienced OpForce in enemy tactics. Thanks for asking.
Capt	33S	Male	M9	ABSOLUTELY!!!! As an officer, I've shot twice in 5 years. I feel everyone should be exposed to firing a weapon every year. No matter what AEF bucket you're in. In fact, those in an AEF bucket should be firing a weapon more often than once a year. The combat skills requirements should increase once you've been selected for a deployment or bucket. We need to develop this aspect of our service. Those non-flyers are more likely to be killed in this war than those in the operations communities. As a Comm and Info officer, I should be able to set up comm and kill the bad guys. I feel very confident in setting up comm and less than confident in killing bad guys.
1Lt	21R	Male	WEAPONS NO RESPONSE	ACC is heading in the right direction with the implementation of "ready to deploy" training which covers basic manuevers in convoy ops and personnel movement as well as firing discipline. However, I feel it could be better. Every base with a flying mission typically has assigned SERE instructors. We should have a 2-3 day course, taught by SERE instructors that covers basic combat survival skills (more than knowing how to shoot) and escape/evasion. This survival course should have classroom instruction followed by practical application in the feild. The training should be on a recurring basis or at least every time a person deploys.
2Lt	33s1	Male	Self-Aid Buddy Care	Actual fighting skills might also be useful. Weapons training is not conducted frequently enough in my opinion.
Maj	33S4	Male	M9	Add: shoot targets from behind different forms of cover; shoot targets at various angles from the defender, i.e., high, low, left, right

Appendix F: Comments from the Survey

TSgt	3E2X1	Male	Chemical Warfare	Additional "in depth" combat skills; ground combat, enemy weapons and issue weapon training,alternate weapons (ASP batton etc....,live fire annually included with AFQC, realistic range distances, Close Quarters Battle, weapon transition (m-16 to m-9) hand to hand combatives, survailance basics LPOP procedures, Air Base Defense (intense)
Maj	14N	Male	Self-Aid Buddy Care	additional fire arms familiarity, small arms tactics, perimiter defense tactics and terminonlogy, post-attack base/facility response activities/responsiblities/skills, force protection awarness/response, additional hands on Chem Warfare training
1Lt	32E3E	Male	Law of Armed Conflict	Additional heavy weapons instruction and small unit infantry tactics
SMSgt	3C1X2	Male	Self-Aid Buddy Care	Additional self-defense known as close combat training. Likewise intense weapon training on firing from a car, in a room, or in areas with civilians in the line of fire.
Maj	65F3	Male	Chemical Warfare	--Additional weapons training (firing weapon more than once a year) --Additional emergency medical training beyond first aid/SABC.
SMSgt	3P0X1	Male	Anti-Terrorism Force Protection	Additional Weapons Training; Convoy Operations; Basic ABD for all; Survival Evasion for all.
Maj	32E3H	Male	Anti-Terrorism Force Protection	Advanced convoy and combat engineering operations similar to the ones given to Army engineering units. Right now in Iraq, engineers are working together with Army units and our formal training wasn't tailored for that and it shows our disadvantage. Has to become more of a training mindset change. Just in time training in combat operations (what we are currently doing) is just not enough.
1Lt	65F, 16H	Male	Chemical Warfare	AF basic combat skills training is inadequate for joint deployments
Capt	64P4	Male	M9	AF members are being put in harm's way without the requisite training. Convoy training, defensive fighting positions, etc. are absolutely necessary in today's AF. This is not our father's AF.
CMSgt	1N000	Male	Anti-Terrorism Force Protection	AF members need more training on crew served weapons, how to respond to attacks, some small unit tactics, and an introduction to convoy operations.
Maj	35P4	Male	Anti-Terrorism Force Protection	AF people I know have gone through Army training that is very helpful because they are deploying specifically to Army units in Iraq. I think all AF people should get this training, not just if they go with the Army.

Vita

Captain Rodney E. McCraine graduated from Standley Lake High School in Westminster, Colorado. He entered undergraduate studies at the University of Colorado in Denver, Colorado where he graduated with a Bachelor of Arts degree in Psychology in May 1999. He was commissioned through the Detachment 105 AFROTC at the University of Colorado.

His first assignment was at McConnell AFB as a supply officer in July 1999. In May 2002, he was assigned to the 355th Supply Squadron, Davis-Monthan AFB, Arizona where he served as in numerous positions culminating as the Material Management Flight Commander. While stationed at Davis-Monthan, he deployed overseas as the 444th Logistics Readiness Squadron Commander in January 2003 to spend five months deployed in direct support of Operation IRAQI FREEDOM. In August 2004, he entered the Graduate School of Engineering and Management, Air Force Institute of Technology. Upon graduation, he will be assigned to Scott AFB, Illinois.

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

During Operations ENDURING FREEDOM (OEF) and IRAQI FREEDOM (OIF), many Airmen in support career fields were deployed to hostile environments like Afghanistan and Iraq. Deployments of this nature are a departure from normal Air Force operations where support personnel are normally far from the front lines of battle. The purpose of this research was to understand the factors that affect the transfer of basic combat skills training from the classroom to the battlefield. Specifically, this thesis sought to answer five research questions addressing the current combat skills training requirements, the perceived training transfer of basic combat skills, the factors that affect the transfer of basic combat skills, any gaps in current training requirements, and what other types of basic combat skills training should be required to fill any perceived gaps. A 52-item scale measured the perceptions of active duty, Air Force officer and enlisted personnel on their ability to transfer the combat skills learned in a classroom to the battlefield. The research provided a foundation for measuring the effectiveness of combat skills training as a single construct made of five separate training types.

15. SUBJECT TERMS

Training Transfer, Perceived Training Transfer, Perceived Utility, Organizational Commitment, Training Evaluation, Training Effectiveness, Deployment Experience, Military Training

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