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**THREE VIEWS FOR EXPLAINING AND RESOLVING THE RECRUITMENT  
AND RETENTION CHALLENGES OF THE EXPLOSIVE ORDNANCE  
DISPOSAL (EOD) CAREER FIELD**

THESIS

John A. Johnson, Master Sergeant, USAF

AFIT-ENV-MS-20-M-218

**DEPARTMENT OF THE AIR FORCE  
AIR UNIVERSITY**

**AIR FORCE INSTITUTE OF TECHNOLOGY**

**Wright-Patterson Air Force Base, Ohio**

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CAREER FIELD

THESIS

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Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Cost Analysis

John A. Johnson, MS

Master Sergeant, USAF

March 2020

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### **Abstract**

Retention among the Air Force Explosive Ordnance Disposal (EOD) career field has been a concern since the start of the war on terror. Now, as recruiting quotas are not being met, that concern is growing for senior leaders. In the coming years, retention and recruitment will be of the utmost importance to ensure full mission capability. This research analyzes two streams of data, 15 years of manpower information and the results of a survey administered to first-term Airmen, to identify the variables that have the greatest impact on turnover. An additional dataset, personnel data from more than 2,000 EOD candidates, was studied with the intent to maximize the Air Force recruiting efforts. Results show that not getting promoted, only being stationed at one base, being younger, being single, and not receiving combat medals are all associated to early separation from the Air Force for EOD technicians with fewer than seven years of service. Survey data additionally shows that job satisfaction, affective commitment to the Air Force, continuance commitment, focusing on primary duties, and monetary incentive are most important to retaining Airmen beyond their first enlistment. Lastly, analysis of recruits revealed two strong predictors of success in the difficult EOD technical training. Graduates scored significantly higher on five subsets of required entrance exams and they tend to be slightly older (20.7 years or greater) than those who are not successful. Recruits that meet these metrics have an 82% probability of graduating EOD school. The implications of these results, coupled with appropriate application may affect the future of EOD career field health.

*This thesis is dedicated to my wife and children for their unwavering support in this process and to the EOD warriors who risk their lives in the name of freedom...*

*Initial Success or Total Failure!*

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I would like to thank my research advisor, Lt. Col Drylie for providing me flexibility to find a topic that suited my interest and would impact change in my career field. He helped this thesis materialize and gave me encouragement when I thought I hit a wall. This work would not have happened without him. I would also like to express my gratitude to my committee, Dr. Elshaw and Dr. White for providing valuable guidance and input to keep me on the right track and to fill the gaps in my knowledge.

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I would be remised if I did not recognize Mr. John Sanzone from Air Force Manpower and Mr. Johnny Weissmuller from Air Force Personnel Center for committing several days of work to compile the data for this research.

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John A. Johnson

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# Three Views for Explaining and Resolving the Recruitment and Retention Challenges of the Explosive Ordnance Disposal (EOD) Career Field

## Chapter 1: Introduction

### 1.1 Problem Background

In 2008, in the height of fighting two wars, Air Force Explosive Ordnance Disposal (EOD) technicians found themselves stretched thin, with a heavy operations tempo (Tortella, 2009). It was around that time that the Air Force recognized that EOD manning had hit a critical level. In an effort to correct the deficiency, the Air Force raised the maximum amount of Selective Reenlistment Bonus (SRB) from \$60,000 to \$90,000 (AFPC, 2008). The increase in bonus seemed like a promising solution; however, it was merely a temporary fix. Since 2008, EOD has remained constant, with higher potential bonuses than any other career field (AFPC, 2019). In 2019, we see that increasingly fewer highly skilled technicians are enticed to remain in the force.

In March 2019, Air Force Manpower reported that the EOD career field has a 92% retention rate. Compared to the Air Force rate of 97%, this rate may seem negligible. However, when compounded across multiple years, the impact is dramatic and should be a concern for senior leaders. If this rate were to hold, in five years, EOD would lose 34% of their total forces, compared to just 16% for the entire Air Force. While the difference in retention *rate* may seem small, the magnitude of potential variance is troubling.

Further investigation shows where the most substantial losses are occurring. The same September 2019 Manpower report shows only 80% of first-term Airmen (enlisted personnel with four to six years time in service) in the EOD career field are reenlisting.

This is one of the lowest retention rates since 2008. The number of Airmen with six years of service that are separating from EOD is higher than any other period in a career (see Figure 1).

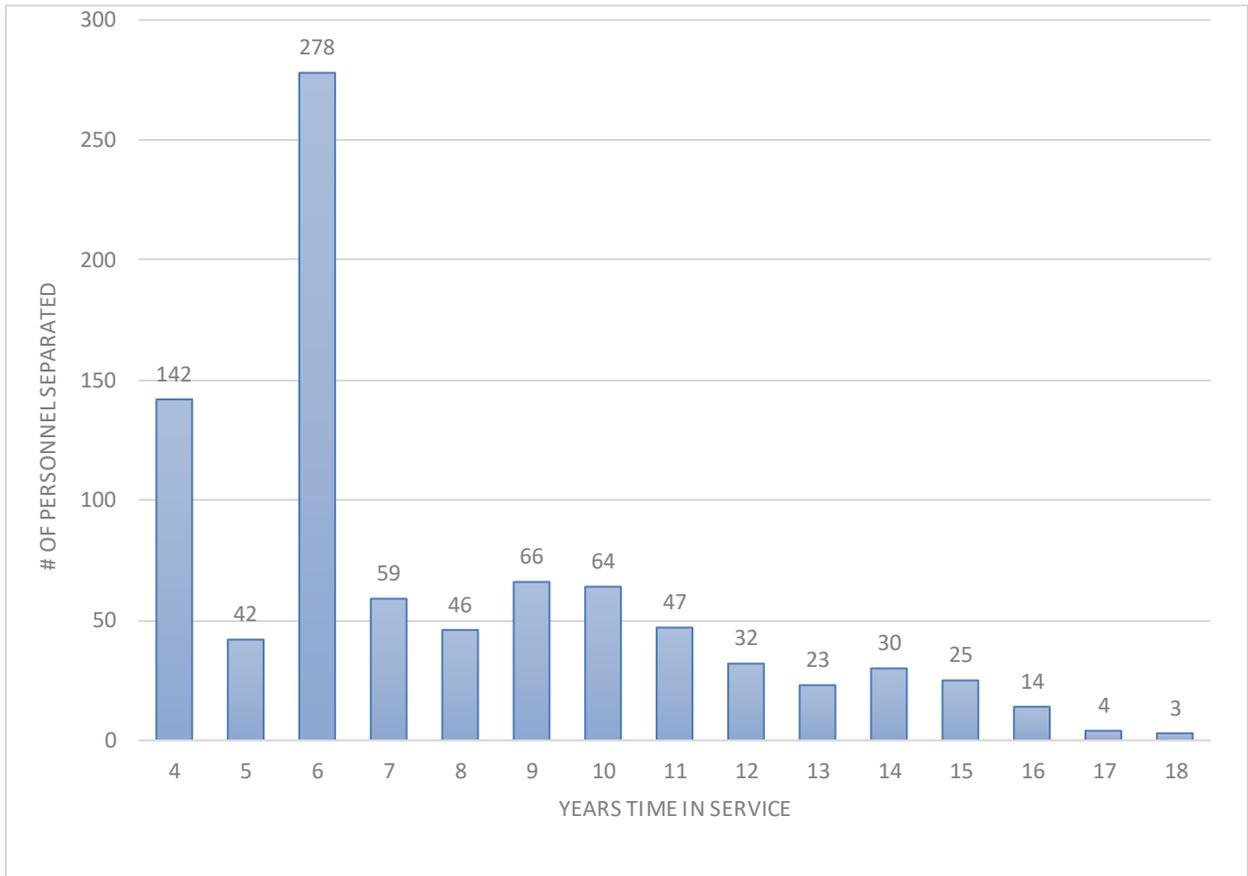


Figure 1: Separation at Time in Service, Oct 2004 – Sep 2019

This timeframe in an EOD career is crucial because these Airmen completing their first enlistment are the ones who are transitioning from being team members to team leaders. They are, thus, the rising generation of Noncommissioned Officers that are needed to move the Air Force mission forward. Additionally, this is the first pivotal decision in an Airman’s career. The Air Force needs to retain personnel at this point to

ensure longevity in the career field. Losing first-term Airmen is critical to the future health of the EOD career field.

What is the solution? Historically, the career field has been replenished through recruiting. For more than 15 years, EOD has offered initial enlistment bonuses to qualified candidates. From 2009 to 2016, this bonus has been sufficient to fill the recruiting quotas. However, in the fiscal year of 2017, this solution began to falter. In the fiscal year 2018, fulfillment dropped significantly, achieving only 48% of the goal. The fiscal year 2019 showed a further decline, with recruitment barely hitting 35% of the original quota. The impact is demonstrated in Figure 2, which indicates the number of personnel by years of service with an overlaid ideal sustainment line.

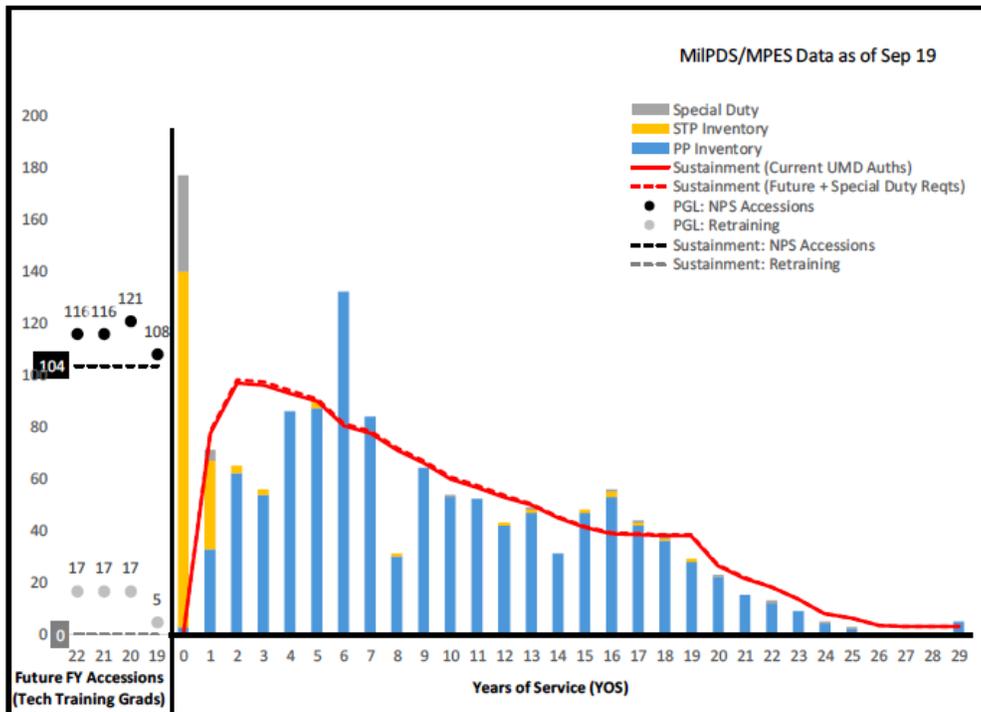


Figure 2: Number of Personnel by Years of Service – Explosive Ordnance Disposal

The effects of two years without reaching quotas are seen in the permanent party inventory lines (blue lines) at years two and three. As shown in the graph, years two and

three fall significantly below the sustainment line. The student inventory (yellow lines) appears to resolve the issue; however, in the fiscal year 2019, only 54 pipeline recruits graduated EOD school. This is alarming for the future health of the EOD career field. It would appear that recruitment may no longer be the solution it has historically been.

## **1.2 Research Scope**

The current study seeks a new way forward. It seeks to answer what we can learn about the characteristics of people who separate versus those who remain within the Air Force. The objective: to better understand how we might increase retention of those we have and alter our identification of those we recruit. The study will be comprehensive, using all available, pertinent Air Force data as well as generating new data. Namely, it utilizes extensive manpower data, developed survey data, and recruitment data.

A1M, Air Force Manpower Office, tracks a considerable amount of data about active-duty personnel. A dataset provided by this office will be used to identify patterns, trends, and ultimately variables that are indicative of separating from the Air Force. This unique dataset gives insight into the careers of over 2,000 active EOD technicians, spanning 15 years. Because decisions are not made in a vacuum, this data will be complemented by a set of prevailing economic variables. Together, these comprise the primary data set for exploration. The objective is to identify the variables that are most influential in an Airman's decision to separate from the military.

A survey administered to first-term Airmen gives this demographic a podium to voice their concerns and acknowledge their future plans. It is based on validated survey questions from the Organizational Commitment Questionnaire (OCQ), the gold standard for measuring commitment and job satisfaction as they pertain to turnover. The objective

of this survey is to identify correlates to separation and build a predictive model that will give senior leaders enhanced knowledge on how to address future recruitment and retention decisions. While this survey data cannot be linked to the larger extensive database, the survey replicates a select set of those variables, sufficient to enable the researcher to determine if the patterns in the survey match those of the larger database.

The last facet of this study is to analyze 15 years of recruitment data. This collection of demographics and test scores will serve to build a profile for a successful recruit. While this study will not be able to solve the throughput of candidates into the EOD training pipeline, it does hope to make the Air Force more efficient with its placement of recruits.

### **1.3 Research Questions**

This research aims to answer the following questions:

1. What demographic, career, and macroeconomic variables correspond with EOD first-term Airmen separation?
2. What demographic career, and macroeconomic variables correlate to retaining EOD technicians beyond a second enlistment (7 to 12 years time in service)?
3. What are the prevailing variables or constructs that have the greatest effect on the current first-term Airmen's decision to separate from the Air Force?
4. What are the demographics and test scores of recruits that render the greatest probability of succeeding in EOD training?

### **1.4 Issues and Limitations**

Other retention considerations include the state of the economy and the change in military retirement benefits. It is essential to recognize that in 2008 there was a

significant economic recession that could potentially affect the data and retention metrics. Also, in 2017 the military switched to a new retirement system that does not require members to serve 20 years to reap benefits. It is believed that this new system will affect retention; however, it is too recent to make statistical inferences regarding the predicted outcomes.

It should also be recognized that the EOD career field recently (2019) relaxed their test score standard for entrance into the career field. This has potential ramifications to alter the current status quo. Another monumental change occurring recently was to open up retraining opportunities to Airmen with two years of service. This unprecedented alteration to policy should have an effect on career field health. Finally, the latest increase in initial enlistment bonuses could affect the throughput of recruits. These factors will undoubtedly change manpower possibilities and projections in the near future. The current study contributes to answering *what else* leadership may wish to change.

## **1.5 Thesis Outline**

Chapter two of this work reviews current literature regarding retention, surveys, and application of regression analysis methodology. Chapter 3, Methodology, describes in detail the datasets to include specific inclusion and exclusion criteria. It goes on to explain the sequence of the analysis process. Chapter 4 provides results on all three datasets and gives statistical clarity on significant variables and models. Chapter 5 concludes the study and explores possibilities for future research.

## Chapter 2: Literature Review

### 2.1 Chapter Overview

Given the persistent nature of the military's recruitment and retention problems, this topic has been analyzed from multiple angles and viewpoints. While hundreds of retention studies in a wide variety of disciplines have been conducted over the past decades, this review aims at the most recent literature on military retention and recruitment. This chapter will review the current recruitment challenges, previous military retention studies, EOD specific recruitment and retention studies, turnover intention, and organizational commitment.

### 2.2 Current Recruitment Challenges

Much of the current literature on military recruitment details the immense challenges that are encountered when finding quality personnel to fill the ranks. Feeney (2014) points out that 71 percent of 17 to 24-year-olds in America are ineligible for military service eligibility because of one or more of three conditions: 1) they do not meet the education requirement; 2) criminal activity; and 3) they are not physically fit. Feeney (2014) uncovered that only 70% of young adults that do possess the required diploma are able to pass the Armed Forces Qualification Test. Bender et al. (2018) demonstrate the importance of quality recruits by citing a failed 2009 attempt by the Army to accept waivers for potential soldiers with a criminal record from their youth. This experiment was eventually denounced and labeled a failed attempt to increase the overall strength of numbers. Many of the waived soldiers caused misconduct and were dishonorably discharged (Bender et al., 2018). The final and most prevalent eliminating factor that impedes successful recruitment quotas is that young adults are not physically

fit for duty. This area of eligibility disqualifies 27% of otherwise eligible applicants. Roughly 15,000 candidates fail the entrance physical because they are above the predetermined weight limit for their given height (Christeson, Taggart, & Messner-Zidell, 2009). These are some of the main challenges that military recruiters are facing today as they are attempting to bolster the force.

One aspect of recruiting that has been overlooked in recent years is evaluating the qualities, values, and motivations of the potential recruiting pool of candidates. This pool consists of the demographic that has come to be known as “Millennials” or “Generation Y” and “Generation Z.” They are very different than previous generations and therefore, must be approached in the correct manner. Millennials are the most educated, informed, and interconnected generation that our nation has ever seen (Wienbaum, Girven, & Oberholtzer, 2016). Their trust in the government is waning, and many are supportive of a progressive social agenda.

More studies are beginning to emerge on the subject of retention as it pertains to millennial employees. In 2017, Walden, Jung, and Westerman surveyed 539 millennial employees in an attempt to quantify the amount of job engagement that is required for retention. Their results imply a greater amount of engagement is required among this generation to reach the desired level of employee-organization relationships (Walden, Jung, & Westerman, 2017). This study shows that retention of the millennial workforce requires a different approach than traditional methods.

In order to make military service appealing to generations Y and Z, it is necessary to identify what they value most. The Pew Research Center lists Millennials’ three main values as: 1) being a good parent; 2) having a successful marriage; and 3) helping others

in need (Taylor & Keeter, 2010). Understanding the candidate pool's motivation and values can assist policymakers in making adjustments to make military service more appealing.

Retention research has also been conducted by comparing military service to comparable alternatives in civilian employment. The prevailing argument is that military service is becoming less desirable due to a failure to compete with the private sector (Gibbons, 2012). While the DoD makes every effort to compensate their people, they continually fall short of civilian occupations. The flexibility of the private sector allows them to compensate their employees through organizational advancement, wage, and benefits that outcompete the uniformed services. A study conducted by Asch and Hosek (2014) suggested that this shortfall by the military directly contradicts principles of successful retention. If the DoD is serious about drawing people towards the service, then they need to make it more attractive than civilian employment.

McMahon and Bernard (2019) made specific suggestions to top military decision-makers to reduce the burden placed upon military members and to align a military career with Millennial values. First, they advise making enlistment periods shorter and making it easier for members who separate to come back to military service. This change would make service more fluid for a generation that values the freedom to change directions. It was also proposed to reduce permanent changes of station (PCS), and relax entrance requirements for education or fitness in an effort to increase the number of recruits in the military (McMahon & Bernard, 2019).

### 2.3 Previous Military Retention Studies and Methodologies

Due to the chronic issue of retention in the military, there have been ample studies conducted in an attempt to frame the problem and discover a solution. Coughlin (1996) realized when studying naval pilot retention that there are internal and external factors that affect the individual's desire to stay. He tested various bonus and incentive pays as well as economic trends. By using an un-weighted logit regression model, he was able to identify unemployment rates, incentive bonuses, and aviation pay as significant variables to predict future continuation rates (Coughlin, 1996).

Schofield (2015) first viewed economic theory of appropriate variables and then applied logistic regression to determine the key variables for line officer retention. Her results showed that the year group of the officer, gender, source of commission, number of years served as enlisted, career field grouping, and distinguished graduate honors were all related to retention (Schofield, 2015). Similarly, Zimmerman (2017) began with a logistic regression approach, but the data behavior was not evident. This led her to turn to a survival analysis, which aided in the goal to create more stable sustainment lines for Air Force manpower.

Lommen's (1999) methodology included multiple linear regression of 11 prevalent economic indicators derived from the Bureau of Economic Analysis and how they related to the retention of enlisted aircraft maintenance personnel. Through this regression technique, he was able to identify a strong relationship between the economy and fluctuation in retention rates. Davis (2010) also used a multiple linear regression techniques in his study to determine which personality traits are tied to increased retention. Although his results were inconclusive, his model, theory, and approach

provide a foundation for solid growth. These recent retention studies show trends of demographic, economic, and other circumstantial factors affecting retention of military personnel.

#### **2.4 Previous EOD Research**

Very few studies have focused on the EOD career field, and only one was found that studied retention. The most recent study that addresses the dwindling stream of recruits in EOD and Special Operations career fields was commissioned by the Air Force in 2018 and completed by the RAND Corporation. Their study looked at EOD and five other Air Force high-demand, high-attrition (HDHA) specialties (Lytell et al., 2018). The RAND research focused on the question: What factors are associated with training attrition? Their best answer to the stated question was that the two largest indicators of training success were how well the candidate performed on the Physical Ability and Stamina Test (PAST) and the Armed Services Vocational Aptitude Battery (ASVAB). The PAST is an examination of the individual's ability to complete specific physical rigors within a set time standard (e.g., 1.5-mile run). The ASVAB is a test given to every recruit to qualify them for service in the Armed Forces, and it measures ten aptitude areas and four overarching areas. The results of these tests assist recruiters in placing candidates in the most appropriate occupation.

Two other studies, one completed by the Air Force and the other by the Army, were conducted with the intent, specifically, of identifying variables in recruits that would lead to success in training. They too, do not comment on retention. In 2013 the Air Force Personnel Center (AFPC) concluded a study on two and three-factor classification models for EOD and Battlefield Airmen career fields (Rose, Manley, &

Weissmuller, 2013). This research sought to build a model for successful recruits based on their overall test scores. The authors considered both the ASVAB and PAST exams, similar to the RAND study. However, an additional exam was added for this study, the Tailored Adaptive Personality Assessment System (TAPAS) test. This examination is a Department of Defense-owned, non-cognitive, personality measurement tool that tests 15 areas related to military performance (see Appendix A). The goal was to find the best combination of these tests that is most predictive of the completion of training. Rose, Manley, and Weissmuller (2013) concluded that the best mix of tests was to either use the ASVAB with the PAST test or all three tests combined. Their analysis did not look at the scores for each individual component of the tests.

The study commissioned by the Army was interested in the same outcome, to predict successful graduation from the EOD training program. The primary difference in this research, conducted by Bundy and Shearer in 2012, was that the Army administered a different personality test called the Multiple Intelligences Developmental Assessment Scales (MIDAS). This personality exam has eight main scales with multiple subscales to give the Army an idea of the profile for that particular person. Unlike the Air Force study, this research did look at individual components of the MIDAS exam. The final model showed that Education, Writing/Reading, Spatial Problem Solving, and Personal Knowledge were positively correlated with a successful soldier. It also revealed that Music Appreciation and General Logic were negatively related to training completion (Bundy & Shearer, 2012). Other observations made by the authors were general personality traits characterized by most technicians. Self-confident, technically oriented, sociable, unconventional, and practical are traits demonstrated by successful EOD

operators. It was also discussed that a correlation exists between the psychological health/physical well-being and successful application of EOD skillsets. These are the results of two studies that aimed to predict success in EOD training. Each of these studies so far, only looks at ways to increase the number of successful entrants. They do not investigate the qualities and conditions that contribute to greater retention.

The most applicable study conducted on EOD retention was completed in 2009 by a former Air Force Institute of Technology student, Captain Joseph Tortella. His research included a survey given to EOD technicians to measure their levels of job satisfaction and intention to leave the Air Force. A large part of the hypothesis testing involved the effect of a high operations tempo as it related to staying in the Air Force. At the time of the Tortella's work, EOD operators were executing six months deployed, followed by 12 months at home before deploying again (2009). Today, in contrast, the current decreased tempo will allow some Airman the rare opportunity to deploy once in their six-year enlistment. The results of the study found that job satisfaction, level of education, perceived organizational support, family concerns, and affective commitment to the Air Force were all correlated to turnover intention (Tortella, 2009).

## **2.5 Turnover Intention**

Although the aforementioned studies identified significant findings with respect to retention, they fail to address the behavioral psychology aspect of the topic. Two aspects of behavioral science that must be explored when researching retention are turnover intention and organizational commitment. Turnover is commonly known as the leaving of an organization, whether it is voluntary or involuntary (Griffeth & Hom, 2001). The military, similar to a professional service firm, relies almost wholly on its

internal labor market. Therefore, managing and tracking voluntary separation is vital at all levels to ensure that future sustainment is obtainable (Holt et al., 2007). Turnover is also a concern of all employers that rely on internal labor because of the experience that the organization loses, which is not always readily replaceable (Steel, Griffeth, & Hom, 2002). Additionally, the organization must burden the cost to train replacements (Colquitt, Lepine, & Wesson, 2011).

The first significant research on turnover was conducted in 1958. It was then concluded that the perceived desirability of the company and how easily the individual could obtain better employment were driving factors for turnover (March & Simon, 1958). Hom and Griffeth (1995) later confirmed that job satisfaction is mediated by perceived desirability, which ultimately predicts turnover. Cotton and Tuttle (1986) published a meta-analysis on turnover and concluded that marital status and number of dependents had a negative correlation on turnover, while level of education had a positive effect.

There have been several recent studies into military turnover as well. Galbraith (2017) looked specifically at the turnover intention of Air Force Financial Management Officers. Her research developed a survey to assess different levels of commitment and overall intention to stay in the Air Force. The final linear regression model highlighted organizational commitment, disengagement, and exhaustion as the primary predictors for turnover (Galbraith, 2017). Olsen (2008) studied the effects of military operations tempo and deployments on turnover and found a slight relationship. A 2005 study inquired about the possible retention of Air Force officers in the Scientist, Engineer, and Program Manager career fields. The results showed that 47% intended to separate at the end of

their commitment. The primary factors leading to this decision were low job satisfaction and frustrations from the assignment system (Beck, 2005). Another study out of Harvard University questioned 242 former military officers that were active between 2001 and 2010. The findings of this research determined that lack of organizational flexibility and diminished commitment to innovation were among the top reasons determining turnover (Falk & Rogers, 2011). Several reoccurring themes in this review of turnover include organizational commitment, job satisfaction, and factors relating to personal resiliency (exhaustion, frustration, deployments, etc.).

## **2.6 Organizational Commitment**

In the civilian sector, phrases like job satisfaction and organizational commitment are proxy for retention and intent to stay. The majority of the literature agrees that organizational commitment is some form of alignment or attachment to an organization (Sawitri, Suswati, & Huda, 2016). Many definitions focus on the behavior of the subject as a reflection of commitment. Others choose to observe attitudes as the basis of loyalty, claiming that the identity of the individual is linked to the institution (Mowday, Steers, & Porter, 1979). The hallmark of a committed employee is their goals become aligned with their employers’.

There are two specific studies that have shaped the way researchers view organizational commitment and remain relevant today. First, Mowday, Steers, and Porter determined that a more rigid definition of organizational commitment must be established to develop an instrument of measurement. This groundbreaking study labeled organizational commitment as: “1) belief in and acceptance of the organization’s goals

and values; 2) a willingness to exert considerable effort on behalf of the organization; 3) a strong desire to maintain membership in the organization” (1979).

Approximately 12 years later, Meyer and Allen developed an advanced definition of organizational commitment as a combination of three related forms of commitment: 1) affective commitment; 2) continuance commitment; and 3) normative commitment (1991). Affective commitment focuses on the individual attachment and identity with the group or unit. Continuance commitment is the need that a person has to stay with that organization (e.g., income or employment). Lastly, a sense of obligation to stay with a company is the normative commitment (Gade, 2003).

It is necessary to distinguish the difference between commitment and job satisfaction as they pertain to retention. Job satisfaction is a response that a person has to certain aspects of their job, but does not necessarily convey any level of attachment. In contrast, commitment is generally a response to an organization as a whole and not the current state of pleasure. Although commitment takes longer to develop, it is usually more stable than job satisfaction (Shore & Martin, 1989).

Another term that is explored when discussing organizational commitment is organizational citizenship behavior (OCB). OCB is behavior of an employee that goes beyond their formal and assigned role (Smith, Organ, & Near, 1983). Exceeding expectations, taking on additional duties, or other voluntary roles outside of the primary duty are all categorized as OCB. Many studies have been done to determine if OCB is a better indicator of retention than organizational commitment. Results have shown that OCB is a strong predictor of adaptation in the workplace; however, most subject matter

experts agree that organizational commitment is a better determinant of turnover (Ozsahin & Sudak, 2015).

At the time of Mowday, Steers, and Porter's deeper look into organizational commitment, there were several parties developing tests to measure this form of attachment. Most of these tools provided a two to four scale test that included questions regarding company seniority, attitudes towards administrators, etc. These tests failed to provide validity or reliability and returned a low coefficient of determination of .03. At that time, this team of behavior psychologists created the Organizational Commitment Questionnaire (OCQ), a 15-question survey that used a Likert scale for responses (Mowday, Steers, & Porter, 1979).

The OCQ was first administered to more than 2,500 employees working in a wide variety of jobs in nine different organizations. The results for the test looked at seven properties to determine if it was a useful tool. First, the means and standard deviations indicated acceptable distributions. The OCQ also returned acceptable results for internal reliability and test-retest reliability. This is necessary so that the test could be used and adapted to different populations. Additionally, the survey was verified that it had convergent, discriminant, and predictive validity. The test also gave insights into normative data and shows how one employee's score compares in magnitude with others (Mowday, Steers, & Porter, 1979). The OCQ has been the gold standard for determining organizational commitment since 1979.

The OCQ has undergone some criticism over the last few decades that should be examined. Commeiras and Fournier acknowledge the OCQ is an effective instrument for measuring organizational commitment; however, they argue that the survey is

multidimensional. The original creators saw the tool as unidimensional, only measuring affective commitment. Commeiras and Fournier believed that the test could also provide a calculative commitment dimension. When testing their theory, the results were consistent for affective commitment; however, the results were not as strong for calculative commitment. While there is some evidence in their claim, affective commitment remains the primary focus of the OCQ (Commeiras & Fournier, 2001).

Not only did Meyer and Allen expound on the definition of organizational commitment by breaking it into three separate categories, but they also began empirical investigation. They did this by creating three eight-item scales to measure affective, continuance, and normative commitments. Their preliminary results showed high levels of internal consistency (alpha coefficients), which indicates that the scales would be a useful tool. An issue arose when testing correlations of the raw scores, which suggests the desire of what the individual wants to do and what they ought to do are not entirely independent. Therefore, the model of Meyer and Allen may prove useful and certainly sheds new light on the intricacies of the subject; however, it does not eliminate the OCQ as an effective measurement tool (Meyer & Allen, 1991).

Organizational commitment has been studied in depth in the military as well. Allen continued her work in 2003 as she shifted her focus to military psychology. She notes as she enters this new domain that previous measures used by the military were not based on theory and lacked the necessary construct development. As she further explored this arena, she identified a phenomenon that she had not previously seen in her research. It was discovered that a focus group of soldiers had different levels of commitment to their nested unit than they did to the parent unit (Heffner & Gade, 2003). Although this

had not been highlighted previously, it is cautioned that the interaction of the parent and nested organizations could impact work behaviors and commitment. Additionally, the two units could have overlapping but different predictors that will be seen in the analysis (Allen, 2003).

Other findings on this subject include those of a 2017 study based on Navy Corpsmen. The authors proposed that organizational commitment is more important in the military than in the civilian sector due to the extensive training, unique experience, and the depth of the impact the organization has on the individual. After surveying 1,597 Corpsmen, it was concluded that preservice motivation, confidence regarding promotion, and high levels of social support accounted for 32% of the variance in organizational commitment (Booth-Kewley, Dell'Acqua, & Thomsen, 2017).

Sumer and van de Ven offered an alternative model of military turnover by stating that organizational commitment only comprised one-third of the overall factors that servicemen and women consider when deciding to stay or leave the military. The suggested that distal and proximal factors also play a significant role in this life decision. Distal factors include characteristics of the organization and perceived job alternatives. Proximal factors that influence turnover are national and local unemployment rate and life shock to the individual, such as loss of a loved one, etc. (Sumer & van de Ven, 2009). Although empirical testing had not been conducted, the theory behind this model is worth exploring further.

Shepherd, in 2017, followed up to the shock factor that was previously hypothesized by attempting to quantify the effect of federally mandated furloughs on organizational commitment. The author administered a nine-question version of the

OCQ to 84 military and civilian government employees, half of which were furloughed and half were not. The results yielded a p-value of 0.015, which shows a statistical significance that employees who were furloughed have lower organizational commitment compared to those who did not go through the same experience (Shepherd, 2017). These findings give merit to previous theory that a shock factor may explain some variance of organizational commitment.

## **2.7 Economic Influences**

There are several economic factors that contribute to recruiting and retaining Air Force personnel. This idea is seen in McMahon and Bernard's work when they propose that the national unemployment average being the lowest it has been in more than a decade is indicative of people not being as willing to enlist (2019). Perhaps the majority of eligible citizens are gainfully employed in the civilian market and do not find the need to commit to the military. Another study further demonstrated that civilian wages, unemployment rates, and other economic variables are correlated to military retention (Savings, Stone, Looper, & Taylor, 1985). The findings of Savings, Stone, Looper, and Taylor were confirmed by Elliot (2018), while an additional factor was uncovered. This research compared Air Force officer attrition rates with outside economic factors and discovered a correlation factor that could be useful to the future of Air Force manpower. The results showed that the national unemployment rate affected officer attrition rate with a two-year lag effect. Jantscher (2016) went one step further with the same methodology and began to look at how economic metrics affected individual Air Force Specialty Codes (AFSCs). She found that retention rates go down when the economy is strong in all jobs except for chaplain and intelligence career fields (Jantscher, 2016). Basalla

(1996) and Beck (2005) looked even further outside the box at different economic factors. By looking at civilian equivalent hiring rates and benefits, over 82% of the variation was explained in a step-wise model of pilot retention (Basalla, 1996). By mirroring civilian pay, promotion, assignment system, and availability of jobs, it was discovered that lower retention rates are often connected to quality of life factors (Beck, 2005). These studies have shown that there is a need to include external factors in a retention study to account for as much of the variation as possible. There is a case that a strong economy results in diminishing recruitment metrics.

## **2.8 Insights**

There are several themes in this literature that provide the building blocks for sound theory to prevail:

- Military manpower is a constant and complex issue that does not have a simple answer.
- Significant factors that seem to influence turnover are: job satisfaction, perceived desirability, incentives, and factors that affect quality of life.
- Organizational commitment is a consistent indicator of retention in most organizations.
- The Organizational Commitment Questionnaire is a useful tool that may be utilized to measure current attachment and predict future strength.
- Economic metrics should be included in a retention and recruitment study as they play a significant role

- The recruitment challenges of today will continue to grow unless the military adapts to its audience. The anticipated model may need proxy variables to account for generational differences.
- There are certain factors that cannot be accounted for in a predictive model (shock factor).
- Linear regression is a useful tool for measuring correlation and possible retention in military personnel. There are multiple ways to employ it, depending on the data set.

## 2.9 Hypotheses

Listed below are the research questions and their corresponding hypotheses developed from the reviewed literature.

*Question 1: What demographic, career, and macroeconomic variables correspond with EOD first-term Airmen separation?*

*Hypothesis:* Low promotion rates, marital status, education level, and indicators of a strong economy (e.g., low unemployment, high GDP, low inflation, low interest, high consumer confidence, high durable goods, low military pay raise, and high civilian pay raise) will all lead to greater separation rates in first-term Airmen.

*Question 2: What demographic career, and macroeconomic variables correlate to retaining EOD technicians beyond a second enlistment (7 -12 years time in service)?*

*Hypothesis:* Inability to get promoted, marital status, education level, and economic metrics indicating prosperity (e.g., low unemployment, high GDP, low inflation, low interest, high consumer confidence, high durable goods, low military pay raise, and high civilian pay raise), will all lead to more people leaving the Air Force.

*Question 3: What are the psychological constructs that have the greatest effect on the current first-term Airmen's decision to separate from the Air Force?*

*Hypothesis:* Affective Commitment to the Air Force, Job Satisfaction and Perception of Promotion will all lead to greater turnover intention. Monetary incentives will also have a negative effect on turnover.

*Question 4: What are the demographics and test scores of recruits that render the greatest probability of succeeding in EOD training?*

*Hypothesis:* Overall, ASVAB score, Mechanical score, Achievement, Dominance, Attention Seeking, and Intellectual will all be measures of a successful EOD recruit.

## **Chapter 3: Methodology**

### **3.1 Chapter Overview**

This chapter discusses the procedures of collecting, preparing, and refining data to conduct this research. Inclusion and exclusion criteria, as well as limitations, are outlined. The employed methodology is described, and hypotheses grounded in logic and theory are presented.

### **3.2 Study Design**

This study was conducted under the Air Force Institute of Technology (AFIT) Institutional Review Board (IRB) protocol (see Appendix B). It comprises three distinct parts, each with its own dataset. They are: 1) Manpower data; 2) Survey data; and 3) Recruitment data. Each dataset can yield different insights to the Explosive Ordnance Disposal (EOD) career field and its retention and recruitment challenges.

### **3.3 Manpower Data**

The first of the three analyses is of the historical EOD manpower data, which was provided by Headquarters Air Force Manpower. The dataset included monthly entries for all personnel that ever entered the EOD training pipeline or held the EOD career designation from October 2004 to September 2019. The number of subjects in the original database was 5,793. Some subjects were present for the entire 15 years. Others just began their careers and provided little data.

The data set included month-to-month snapshot of each individual. This level of granularity was considered important for accurately capturing the details of the moment in which an individual was making the important life decision. A first enlistment commitment in EOD is usually six years long, and the second enlistment will usually take

individuals to the 12-year mark of their career. From there, any member who serves a minimum of 20 years is eligible to retire with full military honors. Therefore, there are key moments in time, key decision points, which must be accurately represented. The advantages theoretically and in actuality are present in Elliot's 2018 study when he looked at variables as they affected retention at the moment and just before the decision was made (Elliot, 2018).

The full set of variables are shown in Appendix C. They include things such as marital status, age, duty location, and ten previous Enlisted Performance Report (EPR) ratings. From these, many more were able to be "constructed" as proxies. In short, this data was an extensive subset chosen by the researcher that manpower uses for a wide variety of military applications.

The focus of the research involving this historical manpower data is to identify statistically significant variables that are consistent with separating from the Air Force at different career intervals.

### **3.3.1 Inclusion/Exclusion Criteria**

The 5,793 individuals captured in this data were not all able to be included in the study. Inclusion and exclusion criteria eliminated 3,776 subjects, leaving 2,017 for the study. The primary reason for exclusion was that the subjects never completed training. 3,441 individuals entered training status but did not make it through the training pipeline to become EOD technicians. Therefore, only individuals who had been awarded the EOD career designator entered the database. This includes all personnel who cross-trained from a different career field into the EOD career field.

Another group that was eliminated was an EOD technician in the most recent month of the data, September of 2019, which had fewer than 5.75 years of service. This reduced the total subjects by 265. The majority of first enlisted commitments for EOD specialists typically run for six years. Thus, at 5.75 years, a decision had not yet been made to reenlist or separate. If they had made the decision to separate, at 5.75 years in service, the date reflecting their intention would appear in the data. Lastly, there were 70 instances in their first six years of service where a member fell off the database without a record of separation. There are innumerable reasons why they may have disappeared from the database (e.g., killed in action, commissioned to officer rank, error, etc.). There is no means to tease out the reason, and all have been eliminated. After all eliminations, the dataset comprised of 2,017 individuals at the most recent month in their career. A detailed list of the exclusions is seen in Table 1.

Table 1: Manpower Dataset Exclusions

Criteria	<i>n</i>	Aggregate Years	Average Years per subject
Initial Dataset	5,793	36,912	6.4
Did not graduate training	3,441	21,243	6.2
Less than 5.75 years in Sept 2019	265	874	3.3
Fell off database with no record	70	308	4.4
Final Dataset	2,017	14,487	7.2

### 3.3.2 Limitations

For these 2,017 individuals, a rich data set was now available. Among the stated intended tests, one variable was not available, and thus a proxy was considered. The lacking variable was the number of deployments and days spent on temporary duty

assignments. Prior studies have tested these quality of life variables as they relate to turnover (Galbraith, 2017; Olsen, 2008; Tortella, 2009). To mitigate this limitation, a proxy variable for combat deployments was created based on the individual's medals earned; however, it is not a direct substitute for the information.

Another variable that was not included in the dataset was the overall Air Force and specific EOD promotion rates. Knowing overall rates would provide an ability to determine the degree to which EOD member's decisions corresponded to trends throughout the Air Force, rather than unique to EOD dynamics. Only two years of this data is available from the Air Force Personnel Center. In the two years of data that was available, promotion rates for each rank of EOD were much lower than that of the same rank for the Air Force. This problem is partially mitigated by including a set of economic variables that point the study to look for external or exogenous factors impacting decisions.

### **3.3.3 Added and Created Variables**

As a means to view the effect of economic variables on the Airman's decision to remain in the Air Force, data was collected from the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS). Additionally, new variables were developed from the dataset to represent different demographics and career changes of the subject. Variables were created to reflect a change of marital status, promotion, and duty location. Receiving awards or administered discipline were also identified and tracked over time. Other variables were created if the subject was stationed at bases with unique mission sets (e.g., nuclear, range clearance, etc.) to reflect the time of their career in which they were at those bases.

### **3.3.4 Methodology**

First, descriptive statistics will be used to identify possible relationships between independent variables and separation from the Air Force. Breakpoint analysis will be conducted on variables that are believed to be predictive based on theory. Breakpoints may be identified through natural breaks in the data or using the quartiles (e.g., 25%, 50%, or 75%) of the data. As breakpoints are identified, they will be transformed into dichotomous variables (“1” and “0”) and will be used in contingency table analysis against the dependent variable, separation. Once significant variables have been identified, they will enter a logistic regression model with the intent of obtaining an odds ratio and confidence interval for each variable as it relates to separation from the Air Force.

### **3.4 Survey Data**

The second of three analyses was conducted as a means to gain an internal perspective into the EOD first-term Airmen (enlisted member with fewer than six years time-in-service) retention problem. A survey was created for this demographic with the purpose and scope of identifying the prevailing variables related to turnover intention and building a predictive model to assist senior leaders with improving the retention rate of these subjects. A secondary purpose for this survey is to provide a deeper understanding of the manpower data analysis of the first tests in the preceding section.

#### **3.4.1 Participants**

As of October 2019, there are 322 EOD first-term Airmen serving at 55 different locations worldwide. Of these Airmen, 318 serve at the flight level as EOD Team

Members, three are serving as EOD training instructors, and one at a Special Tactics Squadron. The ranks and associated populations are represented in Table 2.

Table 2: Total Population of EOD First-term Airmen

Rank	Population
E-2	2
E-3	47
E-4	173
E-5	99
E-6	1

### 3.4.2 Procedure

The standard Air Force procedure to administer a survey to Active Duty personnel is that it must be approved locally and at the Air Force level. Since no personally identifiable information (PII) was being collected, the survey received exemption status at the AFIT IRB. The survey was then sent to the Air Force Survey Office, where it was approved with minor clerical changes and the caveat that the results would be shared with the Air Force Manpower office.

Once approval was received from the Air Force Survey Office (Appendix E), the 70 questions (14 demographic and 56 survey) were entered into an online delivery platform called SurveyMonkey. SurveyMonkey allows the analyst a fast and reliable means of dissemination, collection, and analysis. Due to the small size of the EOD career field, the Career Field Manager (CFM, highest ranking enlisted person in the career field) sent the survey link to all of the EOD representatives at the Major Commands, and it trickled down to the flights from there. The survey officially opened on October 29,

2019, and remained open until November 22, 2019. At the survey close, the number of responses totaled 145 (45.3% response rate).

### **3.4.3 Measures**

The survey, in its entirety can be found in Appendix D. Apart from the demographics portion of the survey, questions were asked in 12 social and psychological constructs related to retention. Each area except for Retention Motivation was adapted from prior surveys, which had been tested for reliability and validity. All questions except for the last were given a Likert scale for the response. The final question of the survey was open-ended for freedom of response. This gave the respondent an opportunity to voice an opinion or make a suggestion on their perception of retention.

The 12 constructs are listed in detail as follows:

#### *Affective Commitment to the Air Force*

A four-item affective commitment scale was adapted from the work of Gade, Tiggel, and Schumm (2003). These questions sought to determine the subject's attachment to the Air Force. "The military has a great deal of personal meaning for me" and "I feel a sense of belonging in the Air Force" are samples of questions in this area.

#### *Affective Commitment to EOD*

Similar to the previous construct, Affective Commitment to EOD measured the emotional attachment to the career field. "I feel emotionally attached to EOD" is one example of a question under this section. The questions for both affective commitment areas were the same, with the exception of the level of focus.

### *Continuance Commitment*

Continuance Commitment was derived from the work of Meyer and Allen in 1991. This three-question construct measures the perceived economic and social costs of leaving the organization. “It would be more economically advantageous for me if I were to separate from the military” is an example of a reverse coded question in this construct.

### *Turnover Intention*

Turnover Intention group of questions was the dependent variable for the study and measured the subject’s willingness to stay in or leave the Air Force. Straightforward questions such as, “As of today, I am planning on reenlisting in the Air Force for at least another four years.” This and two other questions comprised the Turnover Intention measurement.

### *Job Satisfaction*

Job satisfaction construct was measured through four questions sought to quantify the EOD technician’s level of satisfaction found in their work. “I find EOD work rewarding,” and “I like the things I do at work” are examples of Job Satisfaction questions.

### *Preservice Motivation*

A four-question scale assessing motivations and actions prior to joining the military is the objective of the Preservice Motivation construct. Whether or not a person was motivated by an initial enlistment bonus, or if they knew they always wanted to be an EOD technician were asked in this portion.

### *Perceptions of Training*

Three questions were administered with the intent of measuring Perceptions of Training. Derived from a previous study conducted by Booth-Kewley, Dell'Acqua, and Thomsen (2017), this section determines the EOD operator's feelings of preparedness based on of the training the Air Force has provided them.

### *Perceptions of Promotion*

Perceptions of Promotion asks the Airmen for their perspective on the fairness and equity of the current Air Force promotion system. "How confident are you that the current promotion system rewards the most deserving Airmen," is one of the four questions asked in this construct.

### *Perceived Stress*

This two-question examination was developed as part of a study on the 2008 Department of Defense Survey of Health-Related Behaviors by Bray et al. (2016). The two instruments asked about the balance of the subject's personal/work life as well as the amount of stress they experience at work.

### *Job Embeddedness*

The construct of Job Embeddedness looks at the individual's support group. It asks if immediate family and close friends approve of their decision to be in the military and to be an EOD technician.

### *Depression*

The 10-item depression measuring tool was developed by the Center for Epidemiologic Studies and has been tested for reliability and validity (Radloff, 1977). This simple test can show patterns and tendencies of depression in the respondents.

### *Sleep Problems*

The Sleep Problems construct is a part of the Insomnia Severity Index that was developed as a part of insomnia research (Bastien, Vallières, & Morin, 2001). This construct looks to quantify sleep quality while identifying potential red flags for insomnia.

### *Reenlistment Motivation*

The final construct of the survey is a nine-item measurement developed by the research team in collaboration with the Air Force Civil Engineer and the EOD Career Field Manager. The intent of this area is to gain perspective into incentives that matter most to young Airmen. This section, along with the rest of the survey, could potentially shape future policy for the EOD career field.

### **3.4.4 Analysis Methodology**

The first analysis of this study sought to identify predictors of actual attrition decisions and observed behavior. The survey seeks to draw a parallel set of insights or predictors to Turnover Intention.

The first step in analyzing the results of the survey is to test the constructs for internal reliability. Demonstrating internal reliability is a necessary step in determining the validity and accuracy of the survey. This test will determine whether each question within the construct has produced results that are similar and are consistent with the other measures of the intended construct. The alternative is that the questions resonated with the subject differently and are capturing something other than what the researcher intended. The test is done by viewing the multivariate correlations of each group of questions and then conducting a Cronbach's alpha test. The ideal reliability grade is a

score of 0.7; however, a score above 0.6 is acceptable (George & Mallery, 2003). Any construct that has a Cronbach's alpha between 0.6 and 0.7 will be reviewed and tested for possible consistency issues, or questions may be regrouped into another construct. If a score is lower than 0.6, the construct will be reviewed for errors, and the questions will be considered individually in further analysis. Once Cronbach's alpha tests demonstrate consistency, the questions from each construct will be averaged and considered as one answer for that entire grouping.

Once reliability tests have been conducted, univariate ANOVA tests will be conducted on demographic questions as they relate to the dependent variable, turnover intention. This test is specifically looking for a distinct difference in means between those who intend to leave and those who do not. If there is a difference, the variable will be applied to the final model.

Correlation table analysis will then be applied to all constructs of the survey to see how they relate to one another, and most importantly, to turnover intention. The closer the correlation is to 1, demonstrates a stronger correlation between the dependent and independent variables. Correlation table analysis is univariate. Therefore, a significant correlation will be recorded and will enter the final multiple linear regression model. The intention of the regression analysis is to build a model that will be useful for the practitioner in identifying predictive constructs that lead to excessive separation.

Finally, stepwise regression technique will be utilized to determine if any additional nuance might be gleaned from the variables. Once a foundation for the regression is created through stepwise analysis, then ordinary least squares (OLS)

regression will be employed to build a model that is able to account for the greatest amount of possible variance.

### **3.5 Recruitment Data**

The final of the three analyses in this research was to study the traits of successful EOD recruits. This sort of analysis resembles much of the prior research, which has focused on the entrants into the training pipeline of EOD, rather than retention. Its inclusion at the end of this study's emphasis on retention is for three purposes: comprehensiveness, validation, and enrichment. First, the study recognizes that a comprehensive approach to solving the EOD manning problem may require attention to both recruitment and retention. There is practical value in providing as full a picture as possible for the decision-makers. Second, the study seeks to validate or add to the body of knowledge about recruitment predictors, which has already seemed to provide some partial guidance to senior leaders. Third, it seeks to enrich the other sections of this study. The recruitment entrance exam questions provide a psychological picture of those who preserve to enter into the EOD member database as EOD technicians. The ensuing decisions to remain in the Air Force or depart is made by personnel who are not a random sample of the population or of the Air Force in general, but have their own unique characteristics as a group. The addition here allows one to better see the psychological portrait of the EOD member who is later making the stay or go decision. If EOD members value certain things as a group more strongly than others, but that thing is absent for them later on, then the findings here gain additional strength, and provide a motive to take action by leadership.

Air Force Recruitment Services provided a separate database on recruits that entered the Air Force with a desire to become EOD technicians. This data does not have overlap with the previous two databases, meaning that the subjects cannot be linked to those studied previously, and thus is considered for a distinct analysis.

The dataset provided a snapshot of the individual's success in training, basic demographics, and critical recruitment test scores. Demographics of interest were gender, age, marital status, and education attained. The test scores provided were directly from the Armed Services Vocational Aptitude Battery (ASVAB) and the Tailored Adaptive Personality Assessment System (TAPAS). An overall ASVAB score was given as well as scores for each of the ten subsets (General Science, Arithmetic Reasoning, Word Knowledge, Paragraph Comprehension, Mathematics Knowledge, Electronics Information, Auto/Shop Information, and Mechanical Comprehension). Composite scores for four domains (Mechanical, Administrative, General, and Electrical) derived from the subtests were also included in the dataset. Additionally, individual scores from the 15 areas of the TAPAS exam were provided. These different measurement scales are: Achievement, Adjustment, Cooperation, Dominance, Even-Tempered, Attention Seeking, Selflessness, Intellectual Efficiency, Non-Delinquency, Order, Physical Conditioning, Self-Control, Sociability, Tolerance, and Optimism. These are the variables that were assessed during the creation of a model for predicting success in training.

### **3.5.1 Inclusion/Exclusion Criteria**

The raw data provided by Air Force Recruiting Services contained 4,539 subjects that had all taken the ASVAB with the intention of enlisting as an EOD technician. The primary inclusion criteria to remain in the database is that the trainee had to enlist in the

Air Force, graduate Basic Military Training (BMT), and begin the first stage of technical training, the EOD preliminary course, administered at Shepard Air Force Base. Once a trainee began class there, they are officially in the EOD pipeline. However, many of the subjects did not follow through with the enlistment process, did not graduate basic training, or changed their job during the process. This eliminated 1,700 potential candidates from the database, leaving 2,839 subjects.

The second criterion for inclusion was the presence of a TAPAS score. The exam was developed in the early 2000s; however, it did not become standard practice until 2010. Therefore, all recruits prior to 2010 do not have TAPAS data and only have the Armed Services Vocational Aptitude Battery (ASVAB) scores. Therefore, all analyses that contained TAPAS scores, to include the final multiple regression model, only focused on the 1,241 subjects with that attached information. Descriptive statistics and univariate analyses on demographics and ASVAB scores will include all candidates that have the applicable information.

Table 3: Recruitment Dataset Exclusions

Criteria	<i>n</i>
Original dataset	4,539
Did not enter training pipeline	1,700
Total subjects without TAPAS	1,598
Total subjects with TAPAS	1,241

### 3.5.2 Methodology

Methodology for the recruitment data will be conducted similarly to the manpower data. Descriptive statistics will be analyzed to view possible trends and correlations. Then, univariate ANOVA analysis will determine if there is a distinct

difference in the means of demographics and test scores for those who become technicians and those who do not. The significant variables will be further scrutinized for specific breakpoints that are indicative of success in training. These breakpoints will serve to create dichotomous variables for scores and attributes which are above and below the determined threshold. The newly created variables will enter contingency table analysis as independent variables to verify that they are significant in relation to graduating EOD training. At which point, all independent variables will enter a logistic regression model with the intent of producing an odds ratio and confidence interval to predict successful trainees.

### 3.6 Mediation and Moderation

A specific test that will be utilized in the analyses will be identifying mediation and moderation. A mediating variable is an independent variable that explains the relationship between another independent variable and the dependent variable. A diagram depicting this relationship is shown in Figure 3. The mediator, in this case, is an intervening variable which accounts for the relationship between the predictor and the outcome. Mediation provides a deeper look at the psychological mechanisms between two variables that appear related but leave uncertainty of their relationship. Mediation is tested when a strong correlation between a predictor and a dependent variable is lost when another variable is introduced.



Figure 3: Model of Mediation

A four-step test utilizing linear regression was developed by Baron and Kenny (1986) to determine if mediation is present. First, the predictor must be a significant variable when regressed on the dependent variable. Second, it must be shown that the predictor is correlated to the mediator. The third step involves regressing the mediator on the dependent variable. The final action is to conduct a multiple linear regression with the predictor and the mediator on the dependent variable. If the strength of the predictor is lessened in this final model, then it is concluded a partial mediation effect exists. In the event that the predictor is no longer significant in the final model, it is determined that full mediation has been achieved (Frazier, Tix, & Barron, 2004).

Moderation, on the other hand, is tested when the relationship of the suspected independent and dependent variables is weaker than expected. With moderation, one can determine if the relationship is stronger for some than for others within the cohort. The moderator is the distinguishing characteristic to separate one's cohort into two different unique ones. The visual representation can be seen in Figure 4.

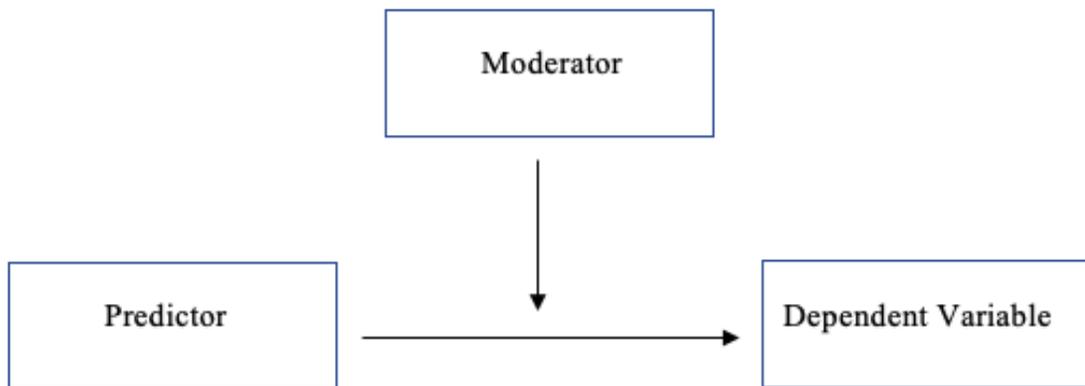


Figure 4: Model of Moderation

Moderation is often tested when a weak or inconsistent relationship between the predictor and the dependent variable unexpectedly occurs (Baron & Kenny, 1986). The procedures are accomplished through a multiple regression approach. A model is created regressing the predictor, the moderator, and the product of the predictor and moderator on the dependent variable. Moderation exists if the product term is significant. Such a relationship implies that the function of the moderator alters the causal relationship between the predictor and the dependent variable (Baron & Kenny, 1986). Again, this test is a frequent test in psychology research, and evidence of moderations is sought after for richer insights and finer assessments.

### **3.7 Chapter Summary**

The methodology of this research is the data that was obtained, the manner in which it was arranged and organized, and the techniques for analysis. These procedures produced sound analysis, which will be detailed in the next chapter.

## **Chapter 4: Analyses and Results**

### **4.1 Chapter Overview**

This chapter describes the analyses of the three datasets described in the previous chapter. The analyses begin with descriptive statistics of the populations or samples. Then, individual variables are analyzed for statistical significance. Once those variables are identified, they enter a multiple regression model. The model is refined until all included variables are below the predetermined level of significance.

### **4.2 Analyses Ground Rules**

All analyses were performed with SAS JMP Version 13 (SAS Institute Inc., Cary, NC). The level of significance for the manpower data analyses and recruitment data analysis will utilize the Bonferroni method to reduce the occurrence of a type I error. This method is achieved by dividing the traditional 0.05 level of significance by the number of independent variables in the model. The survey data analysis will observe the industry standard of 0.05 as the level of significance.

### **4.3 Manpower Data – Separating in the First Seven Years**

The dependent variable in the Manpower dataset was whether or not the individual separated from the Air Force. The first analysis viewed Airmen in their first enlistment (fewer than seven years of total service). If they separated before the seven-year mark, then they were given the dichotomous variable, “1.” If they continued past seven years, they were labeled with a “0.”

#### **4.3.1 Descriptive Statistics**

The raw data, as it was received from Air Force Manpower, included 5,793 distinct subjects with an aggregate time of 36,912 years, averaging 6.4 years per person.

Through inclusion and exclusion, the population was narrowed down to 2,017 individuals. Of the 2,017 men and women of EOD, 473 separated from the Air Force within their first seven years and 271 separated between the seven and 12-year period. Less than seven years means that someone separated after completing only one enlistment. The characteristics of the first study of the population are summarized in Table 4.

Table 4: Descriptive Statistics – Population and Separated with Less than 7 Years Cohort

	Population	Separated with less than 7 years of service	Separation Rate
<i>n</i>	2017	473	23%
Gender			
Male	1906	421	22%
Female	111	52	47%
Ethnicity			
White	1809	429	24%
Other	208	44	21%
Marital Status			
Single	452	261	58%
Married	1392	187	13%
Divorced/Widowed	172	25	15%

Additional variables for the cohort that was retained in the Air Force and the cohort that separated are found in Table 5.

Table 5: Snapshot of Variables at Seven-year Mark

	<i>n</i>	Retained	Percentage	Separated	Percentage
Average age	1434	26.9	-	25	-
Marital Status	1208				
Single	422	161	21.9%	261	55.2%
Married	786	574	78.1%	212	44.8%
Education	1393				
Associate degree or higher	422	326	35.4%	96	20.3%
No degree	971	594	64.6%	377	79.7%
Combat medal	1306				
Yes	626	472	56.7%	154	32.6%
No	680	361	43.3%	319	67.4%
Only 1 base	1269				
Yes	499	182	22.1%	317	71.1%
No	770	641	77.9%	129	28.9%
Made SSgt	1462				
Yes	1059	872	87.6%	187	40.1%
No	403	124	12.4%	279	59.9%
Less than Satisfactory EPR	1595				
Yes	365	245	21.8%	120	25.4%
No	1230	877	78.2%	353	74.6%
Short Tour	1405				
Yes	476	352	36.6%	124	28.0%
No	929	610	63.4%	319	72.0%

It should be noted about the variables in the table above, that due to the time-series nature of the data, the researcher was able to view changes in the subjects throughout their career. These observations serve as a snapshot in time for each different

variable at the seven-year mark of the EOD technician. This level of analysis is beneficial because it allows a comparison of the cohort that separated to the population at the same timeframe of each subject's career. The limitation for taking this approach is that the number of subjects varies for each independent variable. This situation occurs because not every variable is available for each of the 2,017 subjects in the dataset.

In Table 5, marital status, combat medals, if they only had one base, and if they got promoted to Staff Sergeant all stand out as variables with disproportional percentages when comparing the cohort that did separate to the cohort that did not.

#### **4.3.2 Univariate Analysis**

The first test conducted was on the demographic variable, age. Due to the continuous nature of the variable, an analysis of variance (ANOVA) test provides the answer to whether there is a statistical difference in the means of ages of people that separate or remain in the Air Force. A p-value of less than 0.0001 indicates that the two means are statistically different, or that one may be confident that the observed differences in means are not due to chance sampling. The mean age for people that separate in their first term is 25 years compared to the mean age for those that stayed, 26.9.

The next step is to test the dichotomous variables. Contingency table analysis was utilized to determine that eight independent dichotomous variables are related to leaving the Air Force. Those variables: being younger than 25 years old (a variation of the above test), marital status as single, not receiving a medal in the first four years of service, not getting promoted to Staff Sergeant (SSgt), only having one duty station, and not receiving a combat medal. In contrast, having earned an associate's degree or higher

and having served a short tour assignment are negatively related to separation. These results are displayed in Table 6 with their associated p-values, odds ratios, and 95% confidence intervals as they relate to the dependent variable of separating within the first seven years. The odds ratio is simply interpreted as the likelihood of separation occurring given the independent variable. For example, the odds ratio for being under 25 years of age is 5.649. Therefore, if an individual is under 25, they are 5.649 times more likely to separate from the Air Force at the end of their first enlistment.

Now that the significant variables have been identified, a tool different than contingency tables must be used to evaluate them in multivariate space. That tool is logistic regression. Here one can determine if each independent variable remains significant in the presence of the other variables.

Table 6: Contingency Table Analysis Results of Independent Variables – Separated Less than 7 Years Cohort

Independent Variable	P-value	Odds Ratio	Lower 95%	Upper 95%	Relationship to Early Separation
25 years old and younger	<.0001	5.649	4.448	7.175	Positive
Single	<.0001	4.389	3.412	5.646	Positive
Associates degree or higher	<.0001	0.464	0.357	0.603	Negative
No medals in the first four years	<.0001	2.241	1.791	2.804	Positive
Did not make SSgt	<.0001	10.492	8.058	13.662	Positive
Short Tour	<.0001	0.616	0.483	0.785	Negative
Only one base	<.0001	8.655	6.655	11.255	Positive
No combat medal	<.0001	2.139	2.708	3.43	Positive
Less than satisfactory EPR	0.1275	-	-	-	Not Significant

### 4.3.3 Logistic Regression

As all of the variables which proved significant in univariate analysis entered a multivariate logistic model, only those which remained significant in the model were considered. The results revealed that a number of the variables remain significant even in the presence of all of them. Those are: during the first enlistment not making the rank of SSgt, only being stationed at one base, being 25 years of age or younger, being single,

and not receiving a combat medal. Each are significantly associated with the likelihood of separating from the Air Force. Figure 5 shows the JMP output of the log worth of each variable, which depicts the size effect of the variable in the model. This visual shows that not getting promoted to SSgt is about three times as predictive as age or marital status. It also gives the respective p-value for each variable.

Source	LogWorth	PValue
No SSgt, first enlistment	34.458	0.00000
One Base in first enlistment	28.967	0.00000
Age at 7 years < 25	13.374	0.00000
Single at 7 years of service	11.109	0.00000
No Combat Medal in first 7 years	9.660	0.00000

Figure 5: Regression Log Worth and P-Value of Significant Variables – Separated Less than 7 Years

The estimates, standard error, odds ratio, and 95% confidence intervals are reported in the following table (Table 7).

Table 7: Logistic Regression Model Predicting Separation of First-term Airmen

Variable	$\beta$ Estimate	Standard Error	Odds Ratio	Lower 95%	Upper 95%
No SSgt, first enlistment	2.678	0.244	14.551	9.026	23.458
One Base in first enlistment	2.13	0.203	8.411	5.651	12.519
Age at 7 years < 25	1.465	0.198	4.326	2.932	6.383
Single at 7 years of service	1.372	0.205	3.942	2.639	5.888
No Combat Medal in first 7 years	1.214	0.196	3.365	2.291	4.945

The area under the receiver operating characteristic (AUROC) curve was 0.919, which indicates strong predictive capability. The industry standard for an AUROC curve threshold is generally 0.7. An AUROC of 0.7 means that the model is 70% accurate. Therefore, it is understood that the logistic regression model for this analysis is 91.9% accurate. To evaluate the variance of the AUROC, 5,000 bootstrapped samples were generated and analyzed. The 95% confidence interval for the multivariable logistic regression model's bootstrapped AUROC was between 0.901 and 0.935. The final fitted model for the regression is found in Equation 1.

$$\text{Separated in first term} = -3.734 + 2.678 * \text{No SSgt} + 2.13 * \text{One Base} + 1.465 * \text{Age} < 25 + 1.372 * \text{Single} + 1.214 * \text{No Combat Medal}$$

Equation 1: Separated Less than 7 Years – Multiple Logistic Regression Fitted Model

#### 4.3.4 Economic Variables

While it was hypothesized that economic factors would have a strong influence on the decision to remain in the military, the evidence shows otherwise. ANOVA tests were conducted on each of the eight added economic variables to determine whether there is a statistical difference in the means of those that separated and those that did not. The results showed that all eight variables were significant, and the means were truly different when the subjects decided to separate. However, Unemployment Rate, Gross Domestic Product, Inflation Rate, Real Interest Rate, Consumer Confidence, Durable Goods – Manufacturer Real Orders, Durable Goods – Personal Consumption, and Military Pay Raise all were of small magnitudes of differences, and all had relationships contrary to prevailing theory and hypothesized effect. Given the size of the data set, it is not

uncommon to find significant differences that are not meaningful. These variables appear to be of that variety.

Civilian Pay Raise was the exception to the above. While still a small magnitude of difference, it at least corresponds with the theory that if civilian wages increase, more people will separate to take advantage of those increases. Therefore, Civilian Pay Raise was the only economic variable tested in the final logistic regression model. As the output in Figure 5 demonstrates, Civilian Pay Raise did not have sufficient predictive capabilities to remain in the model. Other tests that were conducted based on previous literature were to see if there was a two or three-year lag in the economic variables that could predict the response. All of these tests showed no statistical significance to associate the variable to the separation. It would appear that the personal variables rather than economic variables weigh more heavily upon the decisions of EOD personnel.

#### **4.3.5 Manpower Data – Separating in the First Seven Years - Takeaways**

The main takeaways from this analysis are the significant variables that predict separation at the end of the first-term. In order of strength, they are:

*Not making Staff Sergeant in the first enlistment.* Almost 60% of enlisted EOD technicians that separated from the Air Force in their first term did not achieve the rank of E-5. The inability to get promoted is the strongest factor in the decision to get out of the military after one enlistment. The odds ratio for this variable is 14.55, with a 95% confidence interval of 9.03 to 23.46. This tells the user that if an EOD technician did not make Staff Sergeant in their first seven years of service, then they are 14.55 times more likely to separate.

This variable agrees with the prominent theory that career stagnation will lead to an increase in departure from the employer (Booth-Kewley, Dell'Acqua, & Thomsen, 2017). However, some may ask if this is a real problem, and if the Air Force is interested in retaining those that are unable to make the next rank. This may be true in many cases that the lack of promotion is a proxy for a lack of motivation or ambition. However, it may also be the product of a competitive system in a career field that has boasted some of the highest promotion cutoff scores in the Air Force in recent history. As mentioned in chapter three, recent promotion rates have been lower in EOD than in the Air Force as a whole. The exodus of first-term Senior Airmen from the Air Force could be the result of frustration with a degree of competition in the current process.

*Only stationed at one base in the first enlistment.* Being stuck at one base the entire first enlistment was the variable that stood out the most in the descriptive statistics analysis portion of this study. Although 40% of all EOD Airmen stayed at one base their entire first enlistment, 64% of those actively separated the Air Force. The odds ratio for this variable is 8.41 with a 95% confidence interval of 5.65 to 12.52. Albeit not as strong of a predictor as advancing in rank, only being stationed at one base increases one's odds of separating by 8.41 times.

Only being at one base was not originally hypothesized as a significant variable; however, it does register as a condition that would be important to many people. A unique aspect of the Air Force is that different locations execute different mission sets. Therefore, an added benefit of moving is being able to expand one's breadth of experience. Another motivator for relocation is the benefit it provides young team

leaders for a fresh start as they are entering a new phase of their career. Regardless of the reason, relocating Airmen early in their career shows a trend of greater retention.

*Less than 25 years old.* The third most prevalent independent variable for predicting first-term separation is the age of the individual when they separate or hit the six-year mark. The ANOVA analysis determined that there was a distinct difference of means when it comes to the age of the technician. On average, those that remained in the Air Force were 26.9 years old, compared to the average of 25 years for those that left at the time of their separation or at six years of service. A 4.33 odds ratio tells senior leaders and managers that if an Airmen is less than 25 years old at their six-year mark, then they are 4.33 times more likely to separate. The 95% confidence interval for the odds ratio is 2.93 and 6.38.

It was not hypothesized that age would be a significant variable as it was not prevalent in previous literature. However, this may be a result of maturity or simply a different perspective. Perhaps at a younger age, the individual feels less pressure to commit to a singular career path and feels as if they have more options.

*Single at the 6-year mark.* Marital status also shows a significant effect when predicting early separation of EOD technicians in their first enlistment. More than half of the first-term Airmen that separated were single at the point of separation. Compared to the cohort that remained in the Air Force, only 22% of individuals were single at their six-year mark. The odds ratio for being single is 3.94, with a 95% confidence interval of 2.64 and 5.89. It can be concluded that if an EOD Airman is single when approaching the end of their first enlistment, he or she is almost four times more likely to separate.

It was hypothesized that single people would be more apt to separate based on the premise they may not be as reliant on the stability of a consistent paycheck (Tortella, 2009). While this is a traditional assumption of family living, it certainly will not hold true in all cases. However, with a greater desire to provide for one's family, the risk of walking away from the known to an unknown appears less attractive.

*No combat medals during first enlistment.* Going an entire enlistment without a combat medal showed to be the final significant factor in determining separation during or after the first term. More than 67% of separating Airmen had not received a combat medal in their first enlistment. In the event that an EOD technician did not receive a combat medal in their first six years of military life, they were 3.37 times more likely to separate from the Air Force. The 95% confidence interval for the odds ratio is 2.29 and 4.95.

Although not receiving a combat medal was not hypothesized, it agrees with the general sentiment among technicians. In a career field that has preached combat readiness for the better part of two decades, deploying to a combat zone was the epitome of doing the job. However, in 2012 those deployments started to slow down, and in 2014, they were nonexistent. The rising generation had been told in every level of training to prepare for combat, only to never see it. Not doing the job you trained to do is one theory why not having a combat medal is predictive towards separation from the Air Force. Alternatively, it could be seen as related to career development as the two most significant variables of the multivariate model.

There are several variables that were thought to be significant and did not have predictive power in the final model. It was believed that higher levels of education would

lead to less retention in the military (Cotton & Tuttle, 1986). There was no evidence supporting this theory in the final model. Lastly, multiple hypotheses were formed regarding underlying economic factors, which were all proven to be incorrect or insignificant.

#### **4.4 Manpower Data – Separating Between Seven and 12 Years**

The second analysis from the same manpower database viewed Airmen in their second enlistment. The goal of this analysis was to identify variables that lead to separation or retention in the second term. If the subject stayed past seven years but separated prior to 12 years, they were labeled with a “1.” If they stayed in the Air Force beyond 12 years, then they were labeled with a “0.” The number of observations in the final model of this analysis was 746.

##### **4.4.1 Descriptive Statistics**

Demographic descriptive statistics comparing the population to the cohort that separated between seven and 12 years of service are found in Table 8.

Table 8: Descriptive Statistics – Population and Separated Between 7 and 12 Years

	Cohort		
	Population	Separated between 7 and 12 years of service	Separation Rate
<i>n</i>	2017	271	13%
Gender			
Male	1906	251	13%
Female	111	20	18%
Ethnicity			
White	1809	242	13%
Other	208	29	14%
Marital Status			
Single	452	56	12%
Married	1392	182	13%
Divorced/ Widowed	172	33	19%

Additional descriptive statistics captured in the moment of separation or at the 12-year mark are listed in Table 9.

Table 9: Snapshot of Variables at 12-year Mark

	<i>n</i>	Retained	Percentage	Separated	Percentage
Average age	1144	31.9	-	29.2	-
Marital Status	1144				
Single	158	91	10.4%	67	22.3%
Married	853	693	79.4%	189	63.0%
Divorced	133	89	10.2%	44	14.7%
Education	1143				
Associate degree or higher	408	272	31.2%	136	50.2%
No degree	735	600	68.8%	135	49.8%
Combat medal	857				
Yes	448	283	48.3%	165	60.9%
No	409	303	51.7%	106	39.1%
Cross-Trainee	1144				
Yes	211	179	20.5%	32	11.8%
No	933	694	79.5%	239	88.2%
Made TSgt	746				
Yes	393	346	72.8%	47	17.3%
No	353	129	27.2%	224	82.7%
Less than Satisfactory EPR	1144				
Yes	225	165	18.9%	60	22.1%
No	919	708	81.1%	211	77.9%

Variables that have a much higher percentage among the separated cohort are marital status, education, combat medals, and if the technician was promoted to the rank of Technical Sergeant. These polarizing variables must be analyzed in ANOVA and contingency tables to confirm statistical significance.

#### 4.4.2 Univariate Analysis

Similar to the first analysis, ANOVA procedures were utilized to view the difference of means between those that separated and those that continued in the Air Force. The average age of a person retained beyond a second enlistment is 31.9 years old at the 12-year mark. The average age of those that separate before a third enlistment is 29.2 years old.

Contingency table analysis conducted with the dependent variable of separation gives the following results seen in Table 10.

Table 10: Contingency Table Analysis Results – Separated Between 7 and 12 Years

Variable	P-value	Odds Ratio	Lower 95%	Upper 95%	Relationship to Separation
31 years old and younger	<.0001	6.789	4.746	9.711	Positive
Single	<.0001	2.822	1.987	4.01	Positive
Associates degree or higher	<.0001	2.222	1.683	2.934	Positive
Did not make TSgt	<.0001	12.783	8.796	18.578	Positive
Cross-Trainee	0.0008	0.519	0.347	0.777	Negative
No combat medal	0.0006	0.6	0.448	0.804	Negative

### 4.4.3 Logistic Regression

After determining which variables are significant in contingency table analysis, the objective of building a predictive model for second-term separation is completed. As all independent variables from Table 10 enter the model, only those that are significant at the .05 p-level, corrected by the Bonferroni method, remain in the model. The results of the logistic regression show that the two strongest predictors associated with the likelihood of separation in the time frame of seven to 12 years of service are not making the rank of Technical Sergeant and if the individual is less than 31 years of age. Additionally, one factor that is negatively associated with separation is if the individual is a cross-trainee to the EOD career field. Finally, the variable in the model with the smallest effect size is if the subject has an associate's degree or higher, and if so, is they are more likely to separate. The Bonferroni correction to the level of significance is 0.0125 (0.05/4 variables), and all the variables show a p-value below that threshold. The output from JMP displaying the log worth of the variables and their corresponding p-value can be seen in Figure 6.

Source	LogWorth	PValue
No TSgt <12	37.171	0.00000
Age at 12 < 31	12.670	0.00000
Cross Trainee	2.562	0.00274
Associates or higher at 12 years	2.042	0.00907

Figure 6: Regression Log Worth and P-Value of Significant Variables – Separated Between 7 and 12 Years

The parameter estimates, standard error, odds ratio, and 95% confidence intervals for the logistic regression model are outlined in Table 11.

Table 11: Logistic Regression Model Predicting Separation of Airmen Between 7 and 12

Variable	Years				
	$\beta$ Estimate	Standard Error	Odds Ratio	Lower 95%	Upper 95%
No TSgt in first 12 years	2.426	0.208	11.316	7.528	17.011
Age at 12 years < 31	1.527	0.218	4.604	3.003	7.058
Cross-trainee	-0.765	0.261	0.465	0.279	0.776
Associates or higher at 12 years	0.514	0.199	1.671	1.131	2.471

This second analysis revealed an AUROC of 0.848; which is not as strong as the first analysis, yet still shows predictive value. This area under the curve tells the practitioner that the model is 84.8% accurate. This AUROC was also bootstrapped with 5,000 iterations and returned a 95% confidence interval of 0.817 and 0.876. The fitted logistic regression model is seen below in Equation 2.

$$\text{Separated between 7 and 12} = -3.097 + 2.426 * \text{No TSgt} + 1.527 * \text{Age} < 31 + -0.765 * \text{Cross-trainee} + 0.514 * \text{Associate's degree or higher}$$

Equation 2: Separated between 7 and 12 Years – Multiple Logistic Regression Fitted Model

#### 4.4.4 Manpower Data – Separating Between Seven and 12 Years - Takeaways

The takeaways from analyzing Airmen who separated in their second-term displays statistical significance for correlation of four distinct variables. In order of strength in the model, they are:

*Not making Technical Sergeant by 12 years.* Similar to the analysis of the first enlistment cohort, not being able to advance in rank and pay is the most influential factor when deciding to leave the Air Force. This singular variable accounted for 88% of people that separated in the affected time frame. This variable in the final model not only confirms the previously made hypothesis, but also returns an odds ratio demonstrating that technicians who do not make rank are 11.32 times more likely to separate. The 95% confidence interval for this ratio is 7.53 and 17.01.

*Younger than 31 years old.* Age proved to be a significant variable for the second enlistment as well. Although this was not hypothesized, the ANOVA shows that the mean age for retained personnel was 31.9 compared to 29.2 of those that separated. The odds ratio for a person under 31 years old, faced with the decision to separate at the end of their second enlistment is 4.6, with a 95% confidence level of 3.0 to 7.06.

*Cross-trainee.* Cross-training into EOD from another Air Force career field has proven to show increased retention during the seven to 12-year timeframe. While this was not specifically hypothesized about, 85% of cross-trainees continued on past the 12-year mark. Members who came to EOD from other professions are less likely to separate from the Air Force.

*Associates degree or higher.* The final independent variable that correlates positively to separation during the second term is if the individual has received any form of degree. This finding agrees with what was hypothesized (Cotton & Tuttle, 1986). It was believed that having a degree would increase separation because the person would feel more qualified to enter the civilian workforce. The odds ratio for education was

1.67, with a 95% confidence interval of 1.13 to 2.47. Therefore, operators with a degree are 1.67 times more likely to separate from the Air Force.

Hypothesized variables that were not found to be significant were all applied economic variables. These were tested in the year of occurrence as well as lagged two and three years. Marital status was not found to correlate with separation amongst these cohorts.

#### **4.4.5 Summary of Manpower Data**

By analyzing and testing 15 years of manpower data, nine variables were discovered to have a significant effect on the retention and turnover of EOD technicians in two specific periods of their careers. Utilizing these two predictive logistic models may assist senior leaders in managing personnel and preparing for the future.

#### **4.5 Survey Data**

The manpower study told the practitioner the variables that were significant in the past 15 years to predict separation from the Air Force. The purpose of surveying first-term Airmen was to gain deeper insight into the retention issue by diving into the behavioral psychology of the decision and discover the different motivators of this population. The desired end product of the study is a predictive model using multiple linear regression. The dependent variable for this analysis is the construct from the survey titled, Turnover Intention.

##### **4.5.1 Sample Population**

In the 25 days that the survey was active, it received 145 responses out of 322 eligible candidates, a 45% response rate. Contingency table analysis was conducted to determine if the sample that responded to the survey proportionally represents the

population. Only two demographics returned a significant p-value, thus demonstrating that the sample is slightly disproportionate to the population. There were a higher number of respondents than expected in the demographic of 31 years or older, and those with Bachelor's or Master's degrees. All other demographics are proportionally represented by the sample. Table 12 compares the demographics of the population to the sample, and reports the p-values from the contingency table analyses.

Table 12: Population and Survey Sample Demographics

	Population	% of Population	Sample	% of Sample	P-Value
<i>n</i>	322		145		
<b>Gender</b>					
Male	315	98%	140	96%	0.4322
Female	7	2%	5	3%	0.4322
<b>Rank</b>					
Amn	2	1%	1	1%	0.9321
A1C	47	15%	29	20%	0.1492
SrA	173	54%	82	56%	0.5702
SSgt	99	30%	34	23%	0.1021
<b>Age</b>					
18-20	18	6%	13	9%	0.1858
21-24	138	43%	62	43%	0.9841
25-30	129	40%	64	44%	0.4086
31+	37	11%	7	5%	<b>0.0159</b>
<b>Marital Status</b>					
Single	183	57%	90	62%	0.2867
Married no children	77	24%	35	24%	0.958
Married with children	51	16%	14	10%	0.066
Divorced	11	3%	6	4%	0.7031
<b>Education Level</b>					
No college	60	19%	26	18%	0.8559
Some college	231	72%	94	65%	0.1358
Bachelor's degree or higher	31	10%	24	17%	<b>0.0362</b>

#### 4.5.2 Reliability Tests

Once the data was reviewed for consistency and variation, each construct of questions was tested for reliability. The original reliability score for Perception of Promotion was 0.6490. Although this was an acceptable metric, it was concluded that the questions, “If you stay in the Air Force, how confident are you that you will be promoted as high as your ability and effort warrant?” and “How confident are you that the current promotion system rewards the most deserving Airmen?” should be tested with the Job Satisfaction construct, which had an original Cronbach’s alpha of 0.7389. Perception of Promotion increased to 0.6601, and Job Satisfaction slightly decreased to 0.7204. The final Cronbach’s alpha statistic for each construct is found in Table 13.

All of the constructs met the threshold of 0.6 except for Preservice Motivation. Upon further review, it was determined that these four questions were too polarizing and required to be broken apart and analyzed separately. All other constructs were considered internally reliable, and an average of each respondent’s answers for the entire construct was calculated in the dataset. Once reliability was determined, the data was prepared for univariate analysis of the demographics.

Although Reenlistment Motivation did show internal reliability, it was determined that because these questions aim at a different aspect of retention that they should be tested in the final model individually. These questions also align with the final question of the survey, which gave respondents a platform to voice their opinion and perceptions about retention (See Appendix D). By allowing each of the questions to enter individually, it may be possible to isolate the variable that is responsible for a greater proportion of turnover.

Table 13: Survey Reliability Test Results

Construct	Number of Questions	Cronbach's Alpha
Affective Commitment to Air Force	4	0.8078
Affective Commitment to EOD	4	0.8653
Continuance Commitment	3	0.6756
Turnover Intention	3	0.679
Job Satisfaction	6	0.7204
Preservice Motivation	4	0.3136
Perceptions of Training	3	0.6474
Perceptions of Promotion	2	0.6601
Perceived Stress	2	0.6402
Job Embeddedness	3	0.7537
Depression	10	0.7983
Sleep Problems	4	0.8609
Reenlistment Motivation	9	0.7273

#### 4.5.3 Univariate Analysis of Demographic Questions

The first step in the process of finding variables that are significantly associated with turnover is to conduct ANOVA tests to determine if any one demographic is more likely to have stronger turnover intentions. Each demographic was tested against the

dependent variable, and no single question returned a significant statistical test worthy of further exploration.

#### 4.5.4 Correlation Table Analysis

Correlation table analysis is conducted to view which constructs are correlated to turnover intention and which should enter the model. A correlation table can also demonstrate which constructs are related to each other and could give insight into previously unknown relationships. Significant results from the correlation table are found in Table 14.

Table 14: Correlation Table Results – Turnover Intention

Construct	Correlation (r)	Probability
Affective Commitment to Air Force	0.4956	<.0001
Affective Commitment to EOD	0.4908	<.0001
Continuance Commitment	0.4594	<.0001
Job Satisfaction	0.5911	<.0001
Perceptions of Training	0.3399	<.0001
Perceptions of Promotion	0.4001	<.0001
Perceived Stress	0.1813	0.0291
Job Embeddedness	0.2487	0.0026
Depression	0.2641	0.0013
Sleep Problems	-0.0523	0.5325
Reenlistment Motivation	0.3606	<.0001

It should be noted that the strongest correlations to turnover intention are job satisfaction, affective commitment, continuance commitment, and perceptions of promotion. These results tell the practitioner that if any of these constructs is perceived to be low by the subject, then their intent to leave increases. Other notable strong correlations between other variables are related to job satisfaction. Perceptions of promotion, affective commitment to EOD, and affective commitment to the Air Force correlated at 0.6815, 0.5745, and 0.5651, respectively. These are the results from the correlation table analysis and were considered in the multiple linear regression model.

#### 4.5.5 Multiple Linear Regression

Now that all significant demographic variables have been identified and correlations have been concluded, the affected variables enter the stepwise procedure. The variables determined to be most predictive in order of strength are: job satisfaction, continuance commitment, affective commitment to the Air Force, and reenlistment motivation. These results are displayed with their log worth and corresponding p-value in Figure 7 below.

Source	LogWorth	PValue
Job Satisfaction Average	5.990	0.00000
Continuance Average	5.285	0.00001
Affective Commitment to AF Average	2.220	0.00602
Reenlistment Average	1.328	0.04698

Figure 7: Regression Log Worth and P-Value of Significant Variables – Survey Data 1

This model also accounted for 50% of the variance of turnover intention. Although this is a strong predictive model, another model was tested with the reenlistment motivations entering individually, as opposed to a collective average. The results showed a stronger model with the significant variables: job satisfaction,

continuance commitment, less additional duties, affective commitment to the Air Force, and monetary incentive. This model also allows the researcher to target specific incentives that are most important to the Airmen. The significant variables are shown below in Figure 8.

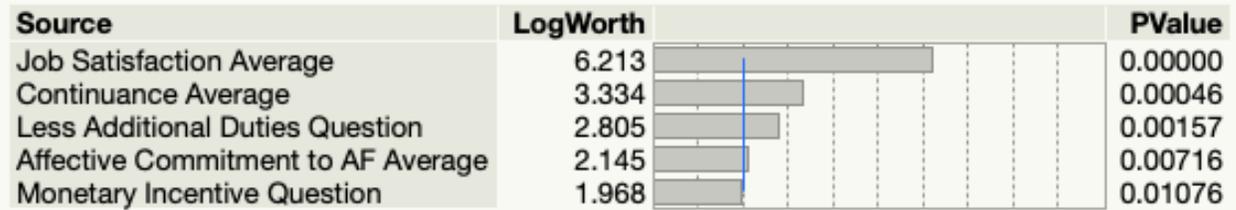


Figure 8: Regression Log Worth and P-Value of Significant Variables – Survey Data 2

Not only are all the p-values lower in this improved model, but this model also explains 55% of the total variance. The parameter estimates for each independent variable are detailed in Table 15.

Table 15: Multiple Linear Regression Model Predicting Turnover Intention

Independent Variable	$\beta$ Estimate	Standard Error	Standard Beta	VIF	Relationship to Turnover Intention
Job Satisfaction	0.618	0.118	0.395	1.795	Positive
Continuance Commitment	0.216	0.06	0.228	1.272	Positive
Less Additional Duties	0.242	0.075	0.193	1.129	Positive
Affective Commitment to the AF	0.219	0.08	0.188	1.487	Positive
Monetary Incentive	0.135	0.052	0.181	1.548	Positive

The equation to the fitted model is seen below in Equation 3.

$$\begin{aligned} \text{Turnover Intention} = & -1.087 + 0.618 * \text{Job Satisfaction} + 0.216 * \text{Continuance} \\ & \text{Commitment} + 0.242 * \text{Less Additional Duties Question} + 0.219 * \text{Affective Commitment} \\ & \text{to AF} + 0.135 * \text{Monetary Incentive Question} \end{aligned}$$

Equation 3: Survey Data Multiple Linear Regression Fitted Model

#### 4.5.6 Mediation Tests

One common theme in social and behavioral psychology is the presence of an intervening variable that explains the relationship between an independent variable and an outcome (Baron & Kenny, 1986). Therefore, the practitioner took care to test and attempt to identify this phenomenon between constructs. After reviewing the correlation tables, it was noted that Perceptions of promotion and Job Satisfaction had the highest correlation between any two variables (0.6815). However, in the final model, Perception of Promotion was not significant. Therefore, these variables were tested for mediation.

First, Perception of Promotion was regressed on Turnover Intention and was found to be significant with a p-value of less than 0.0001 and a standard beta of 0.4. Next, Job Satisfaction is regressed on Turnover Intention and found to be significant with a p-value of less than 0.0001. In the third step, Perception of Promotion is regressed on Job Satisfaction. The result is significant, with a p-value of less than 0.0001. The final step includes regressing both Perception of Promotion and Job Satisfaction on the dependent variable, Turnover Intention. If the effect of Perception of Promotion is lessened, at least partial mediation exists.

The outcome of this regression was that Job Satisfaction remains significant with a p-value of less than 0.0001, and Perception of Promotion becomes insignificant with a

p-value of 0.0581, and the standard beta is 0.146. It is determined that *full* mediation is present because the predictor is no longer significant (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The significance of this mediation is Perception of Promotion manifests itself as Job Satisfaction which then ultimately contributes to Turnover Intention (Baron & Kenny, 1986). This finding is consistent with the previous analyses of the manpower database. The inability to promote was observed to be the leading correlate in predicting separation. In this analysis, it is confirmed that Perception of Promotion is significant and is observed through the lens of Job Satisfaction.

#### **4.5.7 Survey Data Takeaways**

There are several lessons to be learned from analyzing the real responses from operators in the field. First, the significant predictive constructs are viewed in greater detail.

*Job Satisfaction.* After two questions were relocated from Perception of Promotion, the Job Satisfaction construct consisted of six questions (one reverse coded). All six questions sought to capture the individual's level of satisfaction as it relates to their primary EOD duties. It was hypothesized that this construct would have a significant effect on turnover intention (Tortella, 2009). Even with the monetary incentives to stay in the EOD, personal satisfaction and fulfillment are some of the most powerful motivators. This construct had the highest correlation to Turnover Intention (0.5911) and also the lowest p-value of all variables entering the model (<0.0001). The parameter estimate for Job Satisfaction was 0.618. It may be inferred that the lower the satisfaction level (the higher the number on the Likert scale), the more likely the individual is to separate from the Air Force.

*Continuance Commitment.* The second construct responsible for explaining a portion of Turnover Intention's variance is Continuance Commitment. Continuance Commitment aims to measure the individual's perception of the economic and social costs of leaving the Air Force. While not previously hypothesized as significant, Continuance Commitment showed a strong correlation to Turnover Intention (0.4594) with a p-value of 0.00046 in the final model. The beta estimate for Continuance Commitment was 0.216. As junior enlisted EOD personnel feel like they have greater opportunity outside the Air Force, their continuance commitment is reduced, and the likelihood of their separation is increased.

*Affective Commitment to the Air Force.* Affective commitment to the Air Force focuses on the technician's attachment to the Air Force. Questions regarding the individual's sense of belonging and their emotional connection to the Air Force are seen in this construct. Affective Commitment to EOD, when entering multiple regression, was not predictive of turnover intention. A comparison of responses for Affective Commitment to the Air Force and to the EOD career field is found in Table 16. This finding confirms the results of Heffner and Gade (2003) that different levels of commitment exist in nested organizations.

The correlation of Affective Commitment to Turnover Intention is 0.4956, and the p-value in the final model is 0.00716, thus confirming the original hypothesis (Tortella, 2009). The parameter estimate for Affective Commitment to the Air Force is 0.219. Therefore, as technicians feel less committed to the Air Force, the probability of them moving on from the Air Force increases.

Table 16: Affective Commitment Comparison – Air Force vs EOD

	Air Force	EOD
Part of the family		
Strongly agree	3%	44%
Agree	26%	35%
Neither agree or disagree	30%	8%
Disagree	29%	10%
Strongly disagree	12%	3%
Great personal meaning for me		
Strongly agree	17%	68%
Agree	39%	17%
Neither agree or disagree	27%	9%
Disagree	10%	5%
Strongly disagree	7%	1%
Strong sense of belonging		
Strongly agree	3%	38%
Agree	21%	37%
Neither agree or disagree	35%	14%
Disagree	29%	9%
Strongly disagree	11%	2%
Emotionally attached		
Strongly agree	7%	50%
Agree	30%	32%
Neither agree or disagree	29%	12%
Disagree	22%	4%
Strongly disagree	11%	2%

*Fewer Additional Duties/Focus on Primary Duties Question.* One of the questions asked under the Reenlistment Motivation construct was, “I would be more inclined to reenlist if I had fewer additional duties and focused more on EOD training and operations.” Although this question was not in the stated hypothesis, it proved to have predictive power for Turnover Intention. When entering the final model, this significant

incentive question showed a beta coefficient of 0.242. If a person feels that this sentiment is not true, then they are more likely to separate from the military.

*Monetary Incentive Question.* The final independent variable in the multiple linear regression model predicting Turnover Intention is the reverse coded question, “Even if I was offered \$90,000, I would NOT reenlist.” Even though this question had the smallest amount of predictive ability, the significant p-value of 0.01076 confirms the previously made hypothesis. The results of this test are interpreted that if the subject does not feel monetary compensation is important, they are more likely to separate.

While monetary incentive and Continuance Commitment appear to be somewhat related, the low variance inflation factor (VIF) scores for each variable demonstrate that the two are not related to each other in the model. This result might be observed because only one of the three questions in the Continuance Commitment construct focuses on the monetary aspect of the individual’s personal commitment.

Utilizing the fitted model for Turnover Intention, predicted outcomes were calculated for each survey respondent. On a scale from one to five, turnover intention is predicted in the histogram in Figure 9. The higher the predicted value, the more likely the individual is to leave the Air Force. These predicted values may help senior leaders understand the future of first-term Airmen retention in the EOD career field.

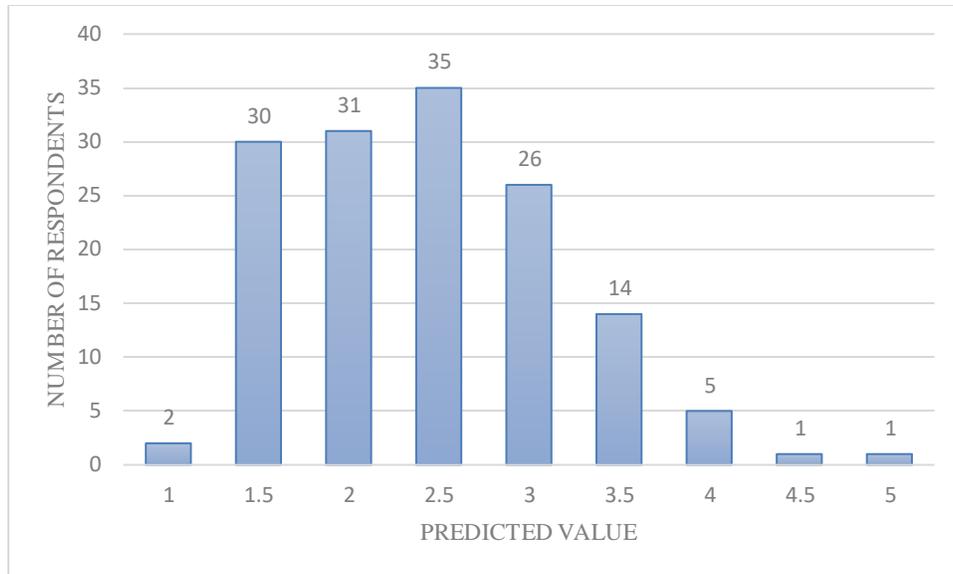


Figure 9: Turnover Intention - Predicted Values

#### 4.5.8 Summary of Survey Data

The survey of first-term EOD Airmen provides statistical analysis of the perceptions of almost half of first-term EOD Airmen. Through OLS regression, five variables have been uncovered and may assist decision-makers in improving the end-strength of EOD Airmen after their first enlistment. Finally, this portion of the research makes great strides in correcting what Allen (2003) recognized as a deficiency of depth in construct development.

#### 4.6 Recruitment Data

The third and final portion of this study was conducted on a separate database comprised of 15 years of recruitment data. The personnel in this database are largely those in the other databases, but there was no technical solution to link all the databases together. Therefore, it is a stand-alone study. If one finds a certain attribute common, one is unable to say if it coexists with psychological constructs identified previously.

The scope of this analysis is to identify individual characteristics and test scores that are

indicative of successful EOD technicians. The ramifications of this study could serve to revamp recruiting methods and improve trainee classification. The dependent variable of this analysis is whether or not the subject graduated EOD school and was awarded the EOD badge.

#### 4.6.1 Descriptive Statistics

As mentioned in the previous chapter, the dataset provided does not include all test scores for all reported trainees. Therefore, descriptive statistics are limited to the data that accompanies it. The demographics of the overall dataset can be seen in Table 17.

Table 17: Descriptive Statistics – Recruitment Dataset

	Dataset	Graduated EOD school	Graduation Rate
<i>n</i>	2838	837	29%
<b>Gender</b>			
Male	2685	804	30%
Female	153	33	22%
<b>Marital Status</b>			
Single	1442	337	23%
Married	1228	433	35%
Divorced/ other	168	56	33%
<b>Education</b>			
High school	2554	721	28%
Some college – no degree	133	56	42%
Associate’s degree or higher	151	60	40%

A subset of the original database was taken based on the recruits that were administered the Tailored Adaptive Personality Assessment System (TAPAS) test. Reducing the number of subjects for subsequent analyses was necessary to offer the most amount of available information to the practitioner. By doing this, all 15 parts of the personality exam were included in hypothesis testing. The demographics for the 1,241 subjects in the data subset are displayed in Table 18.

Table 18: Descriptive Statistics – TAPAS Data Subset

	Subset with TAPAS data	Graduated EOD school with TAPAS data	Graduation Rate
<i>n</i>	1241	343	28%
<b>Gender</b>			
Male	1208	338	28%
Female	33	5	15%
<b>Marital Status</b>			
Single	730	168	23%
Married	459	156	34%
Divorced/ other	52	19	37%
<b>Education</b>			
High school	1113	294	26%
Some college – no degree	50	19	38%
Associate’s degree or higher	78	30	38%

Some notable descriptive statistics are that individuals who are married, divorced, or have some college experience have higher EOD school graduation rates. These demographics, along with test scores, will be tested in univariate analysis for statistical significance.

#### **4.6.2 Univariate Analysis**

Univariate analysis on this dataset included ANOVA and contingency table tests on demographics and all provided test scores. Demographics that were found to be significant were age, education, and marital status.

An ANOVA test tells the practitioner the average age of recruits that failed out of the program was 20.5 years compared to 20.9 years of those who graduated. Now that it has been observed that the mean age of successful graduates is statistically different, the age of the subject will be tested in the final model for predictive properties.

Education also proved to be a significant variable when tested on success in training in contingency table analysis. A dichotomous variable was created to test the effect where a “1” was assigned to the individual if they had any college credits and a “0” if they did not. A p-value of less than 0.0001 was the result of this dependency test.

Marital status was also tested for dependency. The first created dichotomous variable looked only at the married candidates. A p-value of less than 0.0001 shows that there is a level of dependency and significance. The second created variable was similar to the first except that widowed and divorced individuals were also included in the group labeled, “1.” The contingency table test revealed the same significant p-value. These results show that more married, widowed, and divorced individuals graduate EOD training than otherwise expected.

In an effort to identify mental and personality traits of successful recruits, ANOVA analysis was conducted on ASVAB and TAPAS exam scores. The results of the ANOVA tests can be found in Tables 19 and 20, respectively. The primary takeaway from this analysis is that on average, in every area of the ASVAB test, graduated EOD technicians score statistically higher than those that do not graduate. Therefore, these variables will be tested for significance in the final multivariate regression model.

Table 19: ASVAB ANOVA Analysis Results

	Mean score – Non-graduates	Mean score - Graduates	P- Value
Overall score	79.83	84.34	<.0001
Mechanical	79.67	85.59	<.0001
Administrative	79.09	83.67	<.0001
General	80.2	84.57	<.0001
Electrical	81.38	86.84	<.0001
General Science	58.57	60.19	<.0001
Arithmetic Reasoning	58.75	60.96	<.0001
Paragraph Comprehension	58.02	59.46	<.0001
Mathematics Knowledge	58.59	60.66	<.0001
Electronics Information	57.47	60.29	<.0001
Auto/Shop Information	53.49	56.47	<.0001
Verbal Expression	57.66	58.68	<.0001
Mechanical Comprehension	59.84	62.25	<.0001
Assembling Objects	59.53	61.58	<.0001
Word Knowledge	56.76	57.51	0.0003

Out of the 15 tested areas (see Appendix A for a full list of subtests) of the TAPAS, the six listed in Table 20 are statistically significant for those that pass EOD training. This is consistent with the overall internal opinion that the majority of EOD technicians are A-type personalities. All of the variables were considered and tested in multivariate logistic regression for predictive determination.

Table 20: TAPAS ANOVA Analysis Results

Subtest	Mean score - Non-graduates	Mean score - Graduates	P-Value
Achievement	51.16	53.87	<.0001
Intellectual Efficiency	54.11	56.68	<.0001
Physical Condition	53.27	56.1	<.0001
Persist	111.32	116.87	0.0005
Dominance	52.05	54.17	0.0008
Optimism	58.75	60.96	0.0271

#### 4.6.3 Logistic Regression

The first step in creating a logistic model from continuous variables was to conduct breakpoint analysis and find cutoff scores that are indicative of graduating EOD training. These breakpoints will serve to create dichotomous variables and will be tested for significance and predictive value when they enter the logistic regression model. The variables that entered and remained in the model with their accompanying breakpoints, log worth, and p-values are shown in the JMP output in Figure 10.

Source	LogWorth		PValue
Arithmetic Reasoning > 60.9	5.199		0.00001
Paragraph Comprehension > 66	4.215		0.00006
Auto/Shop Information > 56.4	4.171		0.00007
Physical Condition >55.9	2.580		0.00263
Age > 20.7	2.423		0.00378
Dominance > 65	2.296		0.00506

Figure 10: Regression Log Worth and P-Value of Significant Variables – Recruitment

The results show that from strongest to weakest, Arithmetic Reasoning greater than 60.9, Paragraph Comprehension greater than 66, Auto/Shop Information greater than 56.4, Physical Condition greater than 55.9, Age greater than 20.7, and Dominance greater than 65 are all statistically significant at the 0.0083 (0.05/6 variables) significance level. The parameter estimates, to include standard error, odds ratio, and 95% confidence interval, are all included in Table 21.

This analysis showed an AUROC of 0.676. This is interpreted to mean that this model will be correct 67.6% of the time. Bootstrapping at 5,000 iterations of the AUROC gave a 95% confidence interval of 0.636 and 0.703. Additionally, if a recruit meets all of these parameters, their probability of success is 82.3%.

Table 21: Recruitment Logistic Regression Parameter Estimates

Variable	$\beta$ Estimate	Standard Error	Odds Ratio	Lower 95%	Upper 95%
Arithmetic Reasoning > 60.9	0.606	0.134	1.834	1.41	2.386
Paragraph Comprehension > 66	1.214	0.309	3.368	1.855	6.266
Auto/Shop Information > 56.4	0.557	0.139	1.745	1.328	2.29
Physical Condition > 55.9	0.403	0.134	1.497	1.151	1.946
Age > 20.7	0.391	0.135	1.478	1.135	1.924
Dominance > 65	0.373	0.133	1.453	1.119	1.887

The fitted model for the logistic regression is found in Equation 4.

$$\begin{aligned} \text{Graduate EOD Training} = & -2.008 + 0.606 * \text{Arithmetic Reasoning} > 60.9 + 1.214 * \\ & \text{Paragraph Comprehension} > 66 + 0.557 * \text{Auto/Shop Information} > 56.4 + 0.403 * \\ & \text{Physical Condition} > 55.9 + 0.391 * \text{Age} > 20.7 + 0.373 * \text{Dominance} > 65 \end{aligned}$$

Equation 4: EOD Recruit Profile – Multiple Logistic Regression Fitted Model

#### 4.6.4 Recruitment Data Takeaways

The variables in the final regression equation for modeling a successful EOD candidate bring critical implications for the EOD career field and the recruiting profession. The variables examined in further detail are:

*Arithmetic Reasoning > 60.9.* An arithmetic reasoning score greater than 60.9 is predictive of a recruit that is more likely to graduate EOD school. Although it was not anticipated, the outcome of this variable is not surprising due to the problem-solving aspect of the EOD profession. This variable has a p-value of 0.00001 and an odds ratio of 1.834. This tells the user that if a candidate were to achieve a score greater than 60.9 on the arithmetic portion of the ASVAB, then they are 1.83 times more likely to graduate EOD school.

*Paragraph Comprehension > 66.* Another unexpected significant variable is a test score of higher than a 66 on the Paragraph Comprehension portion of the ASVAB. If the recruit achieves that score, they are 3.37 times more likely to earn an EOD badge. However, the 95% confidence interval for Paragraph Comprehension is the widest for any of the variables. It ranges from 1.84 to 6.17. This level of comprehension relates to the necessary ability of attention to detail that is an occupational requirement for EOD technicians.

*Auto/Shop Information > 56.4.* Auto/Shop Information scores greater than 56.4 have shown to be associated to successful training outcomes in EOD school. The p-value is 0.00007, and the odds ratio for this independent variable is 1.74. Although the hypothesized metric of Mechanical aptitude was not significant in the regression model, Auto/Shop Information demonstrates the mechanical nature of the EOD occupation.

*Physical Condition > 55.9.* The first significant variable from the Tailored Adaptive Personality Assessment System (TAPAS) is a Physical Condition score greater than 55.9. This cutoff score is slightly below the mean of graduating technicians. When an individual achieves a score higher than 55.9 on the Physical Condition part of the

assessment, they are 1.5 times more likely to enjoy success in the EOD training pipeline. The EOD profession is a physically demanding job; therefore, the men and women that perform the duties must possess a similar mindset to be proficient in their duties.

*Age > 20.7.* The only significant demographic to enter the model is Age. Specifically, a candidate over the age of 20.7 is predicted to have greater success than a recruit that is younger. While the difference between the means of graduates and non-graduates is not a wide margin, it remains a significant variable and possesses predictive capability. The odds ratio for Age Greater than 20.7 is 1.48, with a 95% confidence interval of 1.14 and 1.92. Perhaps age is a determining factor because it is a proxy variable for maturity.

*Dominance > 65.* The final variable, and the only correctly hypothesized variable in the model, also comes from the TAPAS portion of candidate screening. If the recruit scores higher than a 65 on the dominance portion of the test, he or she has a greater chance of becoming an EOD technician. The odds ratio for Dominance above 65 is 1.45, with a 95% confidence interval of 1.12 and 1.89. Dominance is a common trait in type A personalities and is a vital attribute for technicians whose ability to control situations and assets is of the utmost importance.

#### **4.6.5 Recruitment Data Summary**

By utilizing descriptive statistics, ANOVA tests, contingency tables, and logistic regression, six variables have been identified with a distinct cutoff score that will allow for better recruiting of EOD trainees. This predictive power of the logistic regression model will enable recruiters to place the best fitting candidates into the EOD pipeline and ultimately find success in training.

#### 4.7 Chapter Summary

The results of four separate analysis, derived from three databases, gives great insight into the retention and recruitment problems that have plagued the EOD career field. By gaining this external perspective into the issues, solutions may be formed and implemented for the betterment of the career field.

## Chapter 5: Conclusions

### 5.1 Chapter Overview

This chapter will answer the study's research questions, identify key statistical findings, and propose recommendations to senior Air Force leaders. Future research suggestions to continue this work will be addressed as well.

### 5.2 Research Findings

*Research Question 1: What demographic, career, and macroeconomic variables correspond with EOD first-term Airmen separation?*

*Findings:* The first research question was answered through multiple logistic regression. The significant variables in the final model, which are positively associated to separation at the end of the first-term are (in order of strength): not making Staff Sergeant, only being stationed at one base, being younger than 25 years old, being single, and not having received a combat medal by the time they reach the separation decision point.

*Research Question 2: What demographic, career, and macroeconomic variables correlate to retaining EOD technicians beyond a second enlistment (7 -12 years time in service)?*

*Findings:* The second research question is similar to the first, with the exception that this question aims at Airmen in their second enlistment. While this demographic has not been a major problem for the career field, it is still worthwhile to understand what factors are causing people to leave after completing two enlistments. The final model showed that not getting advanced to the rank of Technical Sergeant, being younger than 31 years old at the 12-year mark, and having an associate's degree or higher are

positively related to separating between seven and 12 years of service. Alternatively, being a cross-trainee showed to be negatively associated with separation.

*Research Question 3: What are the prevailing variables or constructs that have the greatest effect on the current first-term Airmen's decision to separate from the Air Force?*

*Findings:* The results from the survey administered to first-term Airmen showed three constructs and two specific questions that account for 55% of the variation in turnover intention of this demographic. The three constructs with the strongest correlation to turnover are job satisfaction, continuance commitment, and affective commitment to the Air Force. The two questions that are most significant show the EOD technician's desire to focus on their primary duties, and the desire for monetary incentives. All of these variables show a positive relationship to turnover, and all are under the 0.05 level of significance.

*Research Question 4: What are the demographics and test scores of recruits that render the greatest probability of succeeding in EOD training?*

*Findings:* The final research question utilized a dataset provided by Air Force Recruiting Services and is answered through multiple logistic regression. It was discovered that six variables were significant for modeling a successful recruit. The variables are, Arithmetic Reasoning > 60.9, Paragraph Comprehension > 66, Auto/Shop Information > 56.4, Physical Condition > 55.9, Age > 20.7, and Dominance > 65. Recruits that meet all of these thresholds have an 82.3% probability of graduating EOD school.

### 5.3 Recommendations

While it is ultimately the decision of senior Air Force leaders to be the agents of change, it is the researcher's responsibility to identify possible solutions to the identified problems. It is necessary to address each variable and propose possible recommendations.

Primary demographic variables will assist decision makers in understanding the most vulnerable personnel that require priority attention. For example, by realizing that age is related to separation, Flight Chiefs and Superintendents can focus on younger Airmen.

Another variable that is not controlled by senior leaders is whether or not the Airmen experience combat and earn the corresponding combat medals. What can be controlled by flight leaders and supervisors is understanding their Airmen and knowing what helps them gain personal fulfillment. Once they understand this unique aspect, they can begin to support their subordinates and help them find meaning and enjoyment in their occupation. This approach also aims to improve overall job satisfaction.

Not getting promoted is the most predictive variable for separation in both the first and second term. Perception of Promotion was also significantly related to turnover and mediated by Job Satisfaction in the survey analysis. When asked about the current promotion system, 80% of survey respondents stated that they are not confident that the most deserving Airmen are rewarded. While EOD leaders are unable to change the Air Force promotion system themselves, they can continue to identify shortfalls of the system and advocate for their people. Understanding that promotion is a significant variable also helps senior leaders realize that it is important to promote the right people in order to

retain them in the Air Force. Therefore, first-line supervisors and Flight Chiefs should take an active role in mentoring their people and assisting them in achieving the next rank as they put in the work and preparation.

One significant variable found only in first-term retention, which is strongly related to separation, is that Airmen get stuck at one base their entire enlistment. Their careers grow stagnant, and they begin to feel stuck in their situation without end in sight. For senior leaders, it is possible to work within the personnel system to move people around and allow Airmen to gain career-broadening opportunities.

Another avenue for improved end strength that should be explored is recruiting more cross-trainees into EOD. The second analysis of this research showed that cross-trainees are more likely to be retained through their second enlistment. Perhaps there is an opportunity to change recruiting quotas into cross-trainee positions.

Having obtained a degree is a variable that has shown to be significant in retaining Airmen to a third enlistment. It is recommended that EOD continue to invest in human capital and expand opportunities for educating its people. As the Air Force invests in its Airmen, they will most likely feel a sense of belonging and commitment to their respective organizations.

Two of the most skewed answers in the survey given to first-term EOD Airmen were, “I would be more inclined to reenlist if I had fewer additional duties and focused more on EOD training and operations” and “I spend too much time doing non-EOD related work.” More than 91% and 86% of respondents either strongly agreed or agreed with these statements, respectively. Furthermore, 52 of the 95 comments left in the survey expressed dissatisfaction with not performing the function they were trained to do.

A recommendation for senior leaders is to reorganize flight structures to pattern them after special operations units and include administrative personnel to complete non-EOD duties. EOD is a perishable skill set that requires a high level of proficiency. When other activities reduce the amount of time spent on EOD functions, it lowers job satisfaction and overall proficiency.

Recommendations for the recruitment model and associated variables are to implement a screening process for candidates based on their test scores. If a candidate entering the Air Force meets all of the identified scores and metrics, they should be offered a seat in the EOD training pipeline. With an 82% probability of success, this method would assist recruiters in placing the most qualified candidates in a career field where they can thrive.

#### **5.4 Future Research**

There were several limitations and emerging changes that warrant an additional evaluation in the near future. As mentioned, in 2019, the ASVAB standard score to enter the EOD training pipeline was lowered in an effort to increase the number of eligible recruits. The ANOVA analysis currently shows those who graduated EOD school have a mean score of 5 points higher on the ASVAB than those who fail out. However, it would be beneficial in three to five years to execute this analysis again to see how this policy change affected overall manpower.

The Blended Retirement System (BRS), implemented in 2019, gives all Airmen an option to earn towards retirement without committing to 20 years of service. While this may make military service more attractive, it also may make the decision to separate

easier for the member. Therefore, it is suggested that in six years, an attempt is made to measure the effect of the BRS on the separation of first and second term EOD Airmen.

As mentioned previously, combat deployments have been very seldom since 2014; therefore, very few EOD technicians in their first term have received a combat medal. While this variable had been very good at predicting past separation, it may not be the most relevant to the rising generations of operators. This cohort of personnel that joined around 2014 is now entering their decision timeframe to reenlist or separate. Therefore, it is recommended that a new model be created in three to five years to capture the variables that are most applicable to the current first-term Airmen.

## **5.5 Conclusion**

As Air Force EOD enters a critical time period of uncertainty in manpower strength, it is necessary to identify relationships that drive retention and success in EOD training. Much of this research stepped into unprecedented territory with the intent to discover new insights that had not been gained previously through in-depth statistical analysis. Not only did this research aim to identify significant independent variables related to early separation, but it also seeks to expand the body of knowledge on this unique high demand, high attrition (HDHA) career field.

## Appendix A: Tailored Adaptive Personality Assessment System (TAPAS) Scales

TAPAS Scale	Description
1 Achievement	Hard working, ambitious, confident, and resourceful.
2 Adjustment	Worry free, handle stress well, and self-assured.
3 Cooperation	Trusting, cordial, non-critical, and easy to get along with.
4 Dominance	Take charge, headstrong, and natural leaders.
5 Even Tempered	Calm and stable; do not exhibit anger or aggression.
6 Attention Seeking	Attract social attention, loud, talkative, entertaining, and boastful.
7 Selflessness	Generous with time and resources.
8 Intellectual Efficiency	Process information quickly, knowledgeable, and astute.
9 Non-Delinquency	Comply with rules, customs, norms, and expectations.
10 Order	Organize tasks, maintain neat and clean environments.
11 Physical Conditioning	Maintain physical fitness and participate in vigorous sports and exercise.
12 Self-Control	Cautious, patient, and levelheaded.
13 Sociability	Seek out and initiate social interactions.
14 Tolerance	Interested in other cultures and opinions that differ from their own.
15 Optimism	Positive outlook and experience joy and well-being.

(Rose, Manley, & Weissmuller, 2013)

## Appendix B: Institutional Review Board Protocol



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### HRPP Exempt Determination Form

For AFIT HRPP Use Only	
<b>Protocol Number:</b>	REN2019026R
<b>Protocol Title:</b>	Explosive Ordnance Disposal Retention Study

EDO Determination																
<b>Does this submission meet an Exempt Criteria?</b> <i>Select the appropriate exemption category. Categories are defined in Exemption Request Package and on Page 2 of this form.</i>																
	Which exempt category applies? <b>32 CFR 219.104 (d) (2)</b>															
<input checked="" type="checkbox"/> Yes	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Is a limited IRB Review required to determine adequate provisions are in place to protect the privacy of subjects and maintain confidentiality of data?</td> <td style="width: 15%; text-align: center;"><input type="checkbox"/> Yes</td> <td style="width: 15%; text-align: center;"><input checked="" type="checkbox"/> No</td> </tr> <tr> <td colspan="3">                     If a limited IRB review is required, IRB Member determined that <i>either</i>:                 </td> </tr> <tr> <td colspan="3" style="text-align: center;"> <input type="checkbox"/> Sufficient measures were taken to protect privacy and confidentiality.                 </td> </tr> <tr> <td colspan="3" style="text-align: center;"> <b>- OR -</b> </td> </tr> <tr> <td colspan="3" style="text-align: center;"> <input type="checkbox"/> Insufficient measures were taken to protect privacy and confidentiality.                 </td> </tr> </table>	Is a limited IRB Review required to determine adequate provisions are in place to protect the privacy of subjects and maintain confidentiality of data?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If a limited IRB review is required, IRB Member determined that <i>either</i> :			<input type="checkbox"/> Sufficient measures were taken to protect privacy and confidentiality.			<b>- OR -</b>			<input type="checkbox"/> Insufficient measures were taken to protect privacy and confidentiality.		
Is a limited IRB Review required to determine adequate provisions are in place to protect the privacy of subjects and maintain confidentiality of data?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No														
If a limited IRB review is required, IRB Member determined that <i>either</i> :																
<input type="checkbox"/> Sufficient measures were taken to protect privacy and confidentiality.																
<b>- OR -</b>																
<input type="checkbox"/> Insufficient measures were taken to protect privacy and confidentiality.																
<input type="checkbox"/> No	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; text-align: center;"><input type="checkbox"/></td> <td>The human subject research does not meet any exempt criteria. Referred to AFRL IRB Chair for IRB review.</td> </tr> <tr> <td colspan="2" style="text-align: center;"><b>- OR -</b></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>The research uses an In Vitro diagnostic device with specimens that are NOT individually identifiable. Referred to AFRL IRB Chair to determine compliance with applicable FDA regulations.</td> </tr> </table>	<input type="checkbox"/>	The human subject research does not meet any exempt criteria. Referred to AFRL IRB Chair for IRB review.	<b>- OR -</b>		<input type="checkbox"/>	The research uses an In Vitro diagnostic device with specimens that are NOT individually identifiable. Referred to AFRL IRB Chair to determine compliance with applicable FDA regulations.									
<input type="checkbox"/>	The human subject research does not meet any exempt criteria. Referred to AFRL IRB Chair for IRB review.															
<b>- OR -</b>																
<input type="checkbox"/>	The research uses an In Vitro diagnostic device with specimens that are NOT individually identifiable. Referred to AFRL IRB Chair to determine compliance with applicable FDA regulations.															

AFIT EDO / IRB Member Submission Analysis
<b>EDO Reviewer Comments</b>
<p>This study qualifies for exemption under 32 CFR 219.104 (d) (2) because the PI is not collecting any PII, however since the career field is so small, it is possible a subjects identity may be ascertained. The PI will be treating all survey responses as if PII was collected and keeping the data on a secure computer with access only granted to the research team. Any presentation of the data outside the research team will be aggregated so subject identities are protected. Additionally, disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation.</p>

AFIT EDO Signature
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ELSHAW.JOHN.J.1078680454	Digitally signed by ELSHAW.JOHN.J.1078680454 Date: 2019.09.04 11:29:17 -04'00'	Click or tap to enter a date.
<b>Exempt Determination Official</b>	<b>Date</b>	
<b>Note:</b> To sign this form electronically, please save it as a PDF and <a href="#">follow these instructions</a> .		
<b>Exempt Categories</b>		
<b>32 CFR 219.104(d)(1) Exempt Category 1</b>		
Research, conducted in established or commonly accepted educational settings that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.		
<b>32 CFR 219.104(d)(2) Exempt Category 2</b>		
Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if <u>at least one</u> of the following criteria is met:		
<ul style="list-style-type: none"> <li>(i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;</li> <li>(ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or</li> <li>(iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review. <u>Complete Section 6.</u></li> </ul>		
<b>32 CFR 219.104(d)(3)(i) Exempt Category 3</b>		
Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection and <u>at least one</u> of the below criteria are met. Please provide sufficient detail in <u>section 4.1</u> to ensure the criteria has been met. Please refer to the <a href="#">Investigator Guidance</a> on this topic.		
<ul style="list-style-type: none"> <li>(A) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;</li> <li>(B) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or</li> <li>(C) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review. <u>Complete Section 6.</u></li> </ul>		



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<p><b>Note:</b> Benign behavioral interventions are brief in duration, harmless, painless, not physically invasive, not likely to have a significant adverse lasting impact on the subjects, and the investigator has no reason to think the subjects will find the interventions offensive or embarrassing. If the research involves deceiving the subjects regarding the nature or purposes of the research, this exemption is not applicable unless the subject authorizes the deception through a prospective agreement to participate in research in circumstances in which the subject is informed that he or she will be unaware of or misled regarding the nature or purposes of the research.</p>
<p><b>32 CFR 219.104(d)(4) Exempt Category 4</b></p>
<p>Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if <u>at least one</u> of the following criteria is met:</p>
<ul style="list-style-type: none"> <li>(i) The identifiable private information or identifiable biospecimens are publicly available;</li> <li>(ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;</li> <li>(iii) The research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b); (HIPAA Regulations)</li> </ul>
<p><b>Note:</b> HIPAA applies and includes either an <a href="#">authorization or waiver of authorization</a>. It does not include bio specimens, only protected health information (PHI).</p>
<p><b>Note:</b> This does not include primary collection from subjects for the proposed research. It allows both retrospective and prospective secondary use.</p>
<p><b>32 CFR 219.104(d)(5) Exempt Category 5</b></p>
<p>Research and demonstration projects that are conducted or supported by a Federal department or agency, or otherwise subject to the approval of department or agency heads (or the approval of the heads of bureaus or other subordinate agencies that have been delegated authority to conduct the research and demonstration projects), and that are designed to study, evaluate, improve, or otherwise examine public benefit or service programs, including procedures for obtaining benefits or services under those programs, possible changes in or alternatives to those programs or procedures, or possible changes in methods or levels of payment for benefits or services under those programs.</p>
<p><b>Note:</b> These must be posted on a federal website.</p>
<p><b>32 CFR 219.104(d)(6) Exempt Category 6</b></p>
<p>Taste and food quality evaluation and consumer acceptance studies, (i) If wholesome foods without additives are consumed or (ii) If a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.</p>



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Benign Behavioral Interventions

Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection and at least one of the following criteria is met:

- (A) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;
- (B) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or
- (C) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an **IRB conducts a limited IRB review of privacy and confidentiality** to make a determination of exemption. *This determination is based on adequate provisions to protect privacy of subjects and to maintain the confidentiality of the data, based on the July 26, 2017 DHHS (Department of Health and Human Services) and local policies. Data Security Review will likely be required.*

What is a benign behavioral intervention?

- Behavioral interventions must be brief in duration (a few minutes or hours). Although there is no specific amount of time that is defined as brief, OHRP guidance suggests the intervention must be brief in nature, even if subsequent data collection takes longer.
- Interventions may not be harmful, painful or distressing. Risk to subjects is low.
- Interventions must be unlikely to have significant emotional discomfort or adverse lasting impact
- Study content and procedures must not be offensive or embarrassing to subjects
- Medical interventions and procedures are not permissible in this exemption
- Physical (bodily) tasks and physical exercise should not be included in this exempt category.
- Deception can only be used if the subject prospectively agrees to the use of deception. Subjects must be informed prior to initiating the intervention that they will be unaware of, or misled regarding the true nature or purpose of the research. They will also be told whether further information will be provided at the conclusion of the research activities. Researchers should consider de-briefing subjects.
- Research procedures in this exempt category should generally be limited to:
  - communication or interpersonal contact with the subject,
  - the performance of a cognitive, intellectual, educational or behavioral task, or
  - manipulation of the subject's physical, sensory, social, or emotional environment
- Data collection in this exempt category is limited to:
  - verbal (oral) or written responses by the subject
  - data entry by the subject

20 June 2019

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- observation of the subject
- audiovisual recording

**This category does not include the introduction or administration of instruments, substances or energy onto or into the body for research data collection. For example: Fitbit, bioharness, eye tracker, EEG, etc...**

**Some examples benign behavioral interventions:**

- Performing cognitive tasks
- Providing educational materials to participants with the intention of changing their behavior
  - (e.g. smoking cessation, eating habits)
- Playing an online game
- Playing economic games
- Being exposed to stimuli such as color, light or sound at safe levels
- Solving puzzles under various noise conditions

**Note:** If the research involves deceiving the subjects regarding the nature or purposes of the research, this exemption is not applicable unless the subject authorizes the deception through a prospective agreement to participate in research in circumstances in which the subject is informed that they will be unaware of or misled regarding the nature or purposes of the research.

## Appendix C: Variables Included in Manpower Database

- Age
- Gender
- Race
- Marital Status
  - Spouse in military
- Dependents
  - Age of Dependents
- Date entered the military
- Education level
- Other languages
- Medals and awards
- Rank
  - Date of Rank
- EPR Rating (previous 10 years)
- Short tour
- Duty Title
- Current Assignment Location
- AFSC
- Previous AFSC
- Date of Separation

## Appendix D: EOD First-Term Airmen Retention Survey

### Demographics

1. Age
2. Rank
3. Gender
4. Marital Status
5. Education
6. Time in service
7. Time in Grade
8. Number of CONUS duty stations
9. Number of OCONUS duty stations
10. Number of deployments
11. Number of VIP missions
12. Number of TDYs for enhanced EOD skillset (Post blast, NIEF, Range clearance, etc.)
13. Have you ever been PRP?
14. Did you opt into the Blended Retirement System?

### Affective Commitment to the Air Force

15. I feel like "part of the family" in the Air Force.
16. The military has a great deal of personal meaning for me.
17. I feel a strong sense of belonging to the Air Force.
18. I feel emotionally attached to the military.

### Affective Commitment to EOD

19. I feel like "part of the family" in my shop.
20. Being an EOD tech has a great deal of meaning for me.
21. I feel a strong sense of belonging in my shop.
22. I feel emotionally attached to EOD.

### Continuance Commitment

23. It would be more economically advantageous for me if I were to separate from the military.
24. If I were to separate from the military, my life would become less stable.
25. If I were to separate from the military, it would be difficult to find a job in the civilian world.

### Turnover Intention

26. As of today, I am planning on reenlisting in the Air Force for at least another four years.
27. If I could get out of my enlistment early without any negative repercussions, I would take that opportunity.
28. I think about separating from the Air Force when something goes wrong.

### **Job Satisfaction**

29. What is your level of satisfaction with your day-to-day EOD duties?
30. I spend too much time doing non-EOD related work (e.g. additional duties, other military training, military functions, etc.).
31. I like doing the things I do at work.
32. I find EOD work rewarding.

### **Preservice Motivation**

33. I knew I wanted to be an EOD technician long before I joined the Air Force.
34. I have always enjoyed watching explosions/fireworks.
35. I spoke to an EOD technician prior to selecting EOD as my career field.
36. One of the reasons I chose EOD is because it offered an initial enlistment bonus.

### **Perceptions of Training**

37. To what degree is the Air Force providing you with the necessary training to have a successful career as an EOD technician?
38. The training I have received has prepared me to successfully complete a combat deployment.
39. I am unprepared to meet all aspects of the EOD mission.

### **Perceptions of Promotion**

40. If you stay in the Air Force, how confident are you that you will be promoted as high as your ability and effort warrant? (This question was moved to Job Satisfaction in analysis)
41. How confident are you that the current promotion system rewards the most deserving Airmen? (This question was moved to Job Satisfaction in analysis)
42. How confident are you that your supervisor will guide and assist you in making the next rank?
43. How confident are you that your flight supervision will guide and assist you in making the next rank?

### **Perceived Stress**

44. During the past 12 months how much stress did you experience at work or while carrying out your military duties?
45. During the past 12 months how balanced was your personal/work life?

### **Job Embeddedness**

46. Do your immediate family and close friends support you as a member of the US military?
47. Do your immediate family and close friends support your decision to become an EOD technician?
48. Do your immediate family and close friends think you joining the Air Force was a bad decision?

### **Depression**

49. In the last week, I was bothered by things that usually don't bother me.
50. In the last week, I had trouble keeping my mind on what I was doing.
51. In the last week, I felt depressed.
52. In the last week, I felt that everything I did was an effort.
53. In the last week, I felt hopeful about the future.
54. In the last week, I felt fearful.
55. In the last week, my sleep was restless.
56. In the last week, I was happy.
57. In the last week, I felt lonely.
58. In the last week, I could not "get going"

### **Sleep Problems**

59. In the last 2 weeks, the severity of my difficulty to fall asleep was:
60. In the last 2 weeks, the severity of my difficulty to stay asleep was:
61. In the last 2 weeks, the severity of my problems waking up too early were:
62. How satisfied/dissatisfied are you with your current sleep pattern?

### **Reenlistment Motivation**

63. If I could be guaranteed an assignment to the base of my preference, I would reenlist.
64. Even if I was offered \$90,000, I would NOT reenlist.
65. I would have more incentive to reenlist if I was guaranteed an overseas assignment.
66. I would reenlist in EOD if it were easier to make rank.
67. I would be more motivated to reenlist if there were more combat deployment opportunities.
68. A large bonus would be my primary reason for reenlisting.
69. I would be more inclined to reenlist if I had fewer additional duties and focused more on EOD training and operations.
70. What is the minimum amount of bonus money that I would need to reenlist for 4 more years?
71. Please provide comments regarding what influences you to reenlist or separate from the Air Force.

NOTE: Do NOT provide names of individuals, units, or locations. Remember OPSEC guidance and do not discuss or comment on classified or operationally sensitive information. We cannot provide confidentiality to a participant regarding comments involving criminal activity/behavior, or statements that pose a threat to yourself or others.

## Appendix E: Air Force Survey Office Approval



October 28, 2019

MEMORANDUM FOR AF/A4C  
ATTENTION: BRIG GEN JOHN J. ALLEN JR

FROM: AFPC/DSYS  
550 C Street West, Suite STE 152  
Randolph AFB TX 78150-4451

SUBJECT: Survey Approval – Explosive Ordnance Disposal First-term Airmen Retention Survey.

1. The survey is approved for use with the following population(s):

Population:	Number(s):
Air Force Officers (RegAF/AFR/ANG)	0
Air Force Enlisted (RegAF/AFR/ANG)	400
Air Force Civilians	0
Air Force Retirees	0
Total Number to be Surveyed	400

The survey is approved for administration **10/28/2019** through **12/02/2019**; the Survey Control Number (SCN) for this effort is **AF20-004AETC**.

Please ensure compliance with the following guidance, as applicable, while administering your survey.

a. Invitations to participate in the survey must include:

- (1) Survey title (as shown in the subject line of this memo).
- (2) AF Survey Control Number (SCN).
- (3) Statement that completion of the survey is voluntary.
- (4) Link to the list of Air Force approved surveys: <https://www.my.af.mil/gcss-af/USAF/content/valid>
- (5) An AF government contact name or office, with official contact information (e.g., e-mail address, telephone number, etc.), to provide a point of contact for questions about the survey.
- (6) Identifying information of the survey's sponsor, to inform survey recipients under whose authority the survey is being conducted.

(7) All AF attitude and opinion surveys which contain an open ended questions must include the following statement on the questionnaire: "We cannot provide confidentiality to a participant regarding comments involving criminal activity/behavior, or statements that pose a threat to yourself or others. Do NOT discuss or comment on classified or operationally sensitive information."

(8) A copy of the final data collection and analysis report is to be shared with A1XD.

b. If there are civilian employees of a bargaining unit included in the population to be surveyed, the organization conducting this survey must contact the Civilian Personnel Office; Civilian Personnel Element, Manpower & Personnel Flight for their organization to ensure labor union notification is accomplished *prior* to releasing this survey. If this survey involves bargaining unit civilians at more than one base, the organization conducting this survey must notify HQ AFPC/DP3FS, Air Force Program Management and Evaluation.

c. This approval is exclusive to the Air Force community and does not constitute authority for administration to contract employees, individuals from other federal agencies, sister services, etc. Surveys that include individuals from outside the Air Force community must be coordinated through the DOD/WHS/ESCD Information Management Division (commercial phone 703-696-5284).

d. The organization conducting this survey must insure that if this survey requires any changes, request must be submitted to the AF Survey Office for review and approval prior to implementation in accordance with AFMAN 36-2664.

e. If this survey requires an IRB, the PI must submit all proposed survey changes to the AF Survey Office and the IRB Office for review and approval (minor changes do not require a change of SCN number) prior to implementation in accordance with AFMAN 36-2664.

f. AFI 33-115, governs Web Management and Internet usage of websites hosted in the commercial environment (i.e., ".com", ".org", etc.). The organization conducting this survey is responsible for insuring compliance with web management and usage requirements. Questions should be directed to SAF/A6.

g. For information regarding digital certification of e-mails, refer to AFI 33-119, *Air Force Messaging*. The reference for PK enabling (PKE) information is <https://afpki.lackland.af.mil/html/pkenabling.cfm>. For information pertaining to ".mil" accounts, the reference is [https://afpki.lackland.af.mil/html/help\\_desk.cfm](https://afpki.lackland.af.mil/html/help_desk.cfm). Information for systems that are not ".mil" can be found at <http://iase.disa.mil/pki/eca/>. For information on External Certificate Authority or to contact a representative, the reference is [http://iase.disa.mil/pki/eca/contact\\_us.html](http://iase.disa.mil/pki/eca/contact_us.html).

h. The organization conducting this survey must ensure its Operations Security (OPSEC) manager reviews this survey prior to administration. References for the OPSEC Program include: DOD Directive 5205.02, *DOD Operations Security Program*; Joint Publication 3-13.3, *Operations Security*; AFD 10-7, *Air Force Information Operations*; and AFI 10-701, *Operations Security (OPSEC)*.

- i. The public may request survey results under provisions of the Freedom of Information Act (FOIA). Results released outside the Air Force require coordination with Air Force Public Affairs prior to dissemination.
  - j. Data collected under this survey may be subject to the Privacy Act of 1974. Please ensure compliance with this act as set forth in Title 5 United States Code (USC), Sec 552a; Title 10 USC, Sec 55 and 8013; Executive Order 9397; and Air Force Instruction 33-332, *Privacy Act Program*.
2. If you have any questions, please call the Air Force Survey Office at DSN 665-2776 or send an e-mail to [af.surveys@us.af.mil](mailto:af.surveys@us.af.mil).

//Signed//  
RENEE GARRIS  
Management Analyst  
Air Force Survey Office

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<b>14. ABSTRACT</b> Retention among the Air Force Explosive Ordnance Disposal (EOD) career field has been a concern since the start of the war on terror. Now, as recruiting quotas are not being met, that concern is growing for senior leaders. In the coming years, retention and recruitment will be of the utmost importance to ensure full mission capability. This research analyzes two streams of data, 15 years of manpower information and the results of a survey administered to first-term Airmen, to identify the variables that have the greatest impact on turnover. An additional dataset, personnel data from more than 2,000 EOD candidates, was studied with the intent to maximize the Air Force recruiting efforts. Results show that not getting promoted, only being stationed at one base, being younger, being single, and not receiving combat medals all correlated to early separation from the Air Force for EOD technicians with fewer than seven years of service. Survey data additionally shows that job satisfaction, affective commitment to the Air Force, continuance commitment, focusing on primary duties, and monetary incentive are most important to retaining Airmen beyond their first enlistment. Lastly, analysis of recruits revealed two strong predictors of success in the difficult EOD technical training. Graduates scored significantly higher on five subsets of required entrance exams and they tend to be slightly older (20.7 years or greater) than those who are not successful. Recruits that meet these metrics have an 82% probability of graduating EOD school. The implications of these results, coupled with appropriate application may affect the future of EOD career field health.					
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