

WholeSoldier Performance: A Value-Focused Model of Soldier Quality

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ABSTRACT:

This paper provides a model of Soldier performance to address the question “What is a Quality Soldier?” With Value-Focused Thinking as a philosophical approach, and with the mathematical methodology of multiobjective decision analysis, we present a holistic model of WholeSoldier Performance in the moral, cognitive, and physical domains. Routinely implemented across the entire force, this model will provide a continuous measure of performance suitable for use as an endstate metric reflecting what we want in Soldiers. With this information, the Army will be able to better recruit, assign, mentor, train, retain, and promote Soldiers.

Keywords: Soldier Quality, Value-Focused Thinking, Recruiting, Mentoring, Personnel Decisions, WholeSoldier, Performance

1. PROBLEM DEFINITION

1.1. Introduction

One of two U.S. Army capstone manuals, Field Manual 1, *The Army* (HQDA 2005), was written to codify the vision for the Army. The opening paragraph of FM 1 states that:

First and foremost, the Army is Soldiers. No matter how much the tools of warfare improve, it is Soldiers who use them to accomplish their mission. Soldiers committed to selfless service to the Nation are the centerpiece of Army organizations. Everything the Army does for the Nation is done by Soldiers supported by Army civilians and family members. Only with quality Soldiers answering the noble call to serve freedom can the Army ensure the victories required on the battlefields of today and the future.

We would all agree that quality Soldiers are the centerpiece of Army organizations, but what do we mean by quality? In its conclusion, Field Manual 1 states that “as the Army moves into the future, two things will not change – the primacy of Soldiers and Army Values.” With this in mind, this work presents a Value-Focused model to provide a living framework for defining Soldier quality.

1.2. Background

For centuries past and likely for centuries to come, military leaders have debated the qualities desired in a Soldier. It is easy to find that nearly every prominent military leader and researcher has advocated the importance of attributes such as courage, integrity, perseverance, intelligence, loyalty, self-confidence, etc. GEN George Patton (DA PAM 600-65 1985) wrote that “Wars may be fought with weapons, but they are won by men. It is the spirit of the men who follow and of the man who leads that gains the victory.” Later, in a letter to his son, he said “The most vital quality a Soldier can possess is self-confidence, utter, complete, and bumptious.” Many such statements can be found; they generally indicate single attributes desired in a Soldier.

With the inception of the All-Volunteer Force (AVF) in the early 1970s, the high school diploma and Armed Forces Qualification Test (AFQT) became the predominant measures of

Soldier quality. In 1978, a major Department of Defense study stated that the possession of a high school diploma is the best single measure of a person's potential for adapting to life in the military and that high school graduates are more likely to complete their term of service than those without a diploma (US Department of Defense 1978). Other studies confirmed that a high school diploma reflects not only school skills, but, more importantly, personal consistency and effort to achieve a particular goal (Janowitz & Moskos 1979). GEN Donn Starry, then Commander, US Army Training and Doctrine Command (TRADOC), stated that values are better than scores to indicate Soldier quality and that the value of the diploma is that it signifies achievement (Starry 1980). A 1982 study by Army War College students found that a value system consisting of motivation, positive attitude, and self-discipline are the most desired qualities in a Soldier and reinforce the values of the Army (Symons et al. 1982). In 1988, another research team developed a multidimensional model of Soldier performance based on job-knowledge tests, hands-on tests, school knowledge tests, and supervisor performance ratings (Schinnar et al. 1988). There is an abundance of literature and research relating to the quality of Soldiers; we find that military leaders' commentary primarily focuses on the values and attributes desired while researchers' work focuses on easily quantified entry measures such as a test score or passage through a particular gate. As of yet, we have not found a holistic model that codifies what we want across many domains of Soldier quality; such a model is required to facilitate informed discussion and decisions as we recruit, assess, assign, promote, and retain Soldiers.

It is both difficult and important to define and measure Soldier quality. In their War College Report, Symons et al. (1982) aptly noted:

The topic is an emotional one and fraught with implications for both the effectiveness and the morale of the Service at a time when the national defense is a major concern both at home and abroad. Moreover, even stripped of emotion, the issue of the quality of the Soldier is at least as old as the Army itself. Despite the time and energies devoted to study of this question, a firm definition of quality has eluded most researchers and for every espoused theory, another exists with a countering and persuasive argument. Quality itself is a qualitative descriptor and resists quantification in an age when quantifiable data is required for everything from computer-assisted systems design to budget justifications.

Nearly three decades later, we find that similar conditions still exist. With this in mind, we find great purpose and motivation from Lord Kelvin's dictum that "when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind (Thompson 1891-1894)." Although the problem of defining and quantifying Soldier quality is both emotional and difficult, it is extremely important and must be tackled continually.

In this paper, we provide a holistic model of what the Army wants relating to Soldier performance to frame the quality debate as a living model and facilitate improved decision making concerning our most precious resource. MG Bostick, then Commander of United States Army Recruiting Command (USAREC), commissioned this study in June 2008 to "get outside the box" and "measure the heart of a Soldier." To begin, we establish synergy with other

ongoing research efforts, frame the issue, demonstrate the current gap in research, and establish our problem statement. Second, we discuss the Value-Focused Thinking approach and our modeling methodology. Finally, we provide insights from our initial implementation of the model, recommendations, and the possible strategic impacts of using a Value-Focused approach to measure the performance of Soldiers.

1.3. Decision Environment

During the early stages of our problem definition, we found great synergy with several relevant research efforts. One study proved particularly relevant in understanding the decision environment we face. In 2006, GEN William S. Wallace, then the TRADOC commander, commissioned a study on the Human Dimension “to serve as a point of departure for wide-ranging discussions, research, and investigations into the performance, reliability, flexibility, endurance, and adaptability of an Army made up of Soldiers, their families, civilians, and contractors” (TRADOC 2008). The study describes the human dimension as the “*moral, cognitive, and physical* components of Soldier and organizational development” and states that “Army concepts acknowledge the Soldier as the centerpiece of the Army, but none, individually or collectively, adequately addresses the human dimension of future operations.” Within the context of the expected future global operating environment, this study looks in depth at expected soldier performance in the moral, physical, and cognitive domains. Figure 1 is a visual depiction of the established operational problem statement:

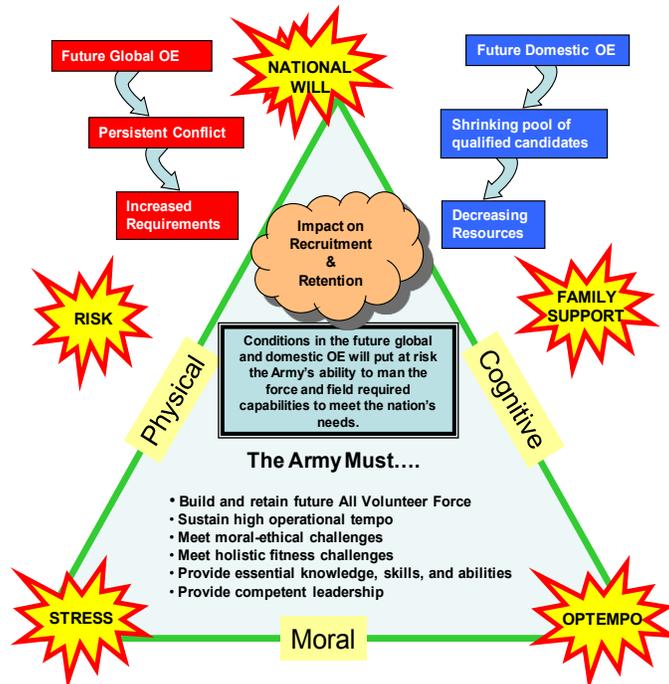


Figure 1. Depiction of HD Operational Problem Statement (TRADOC 13 SEP 2008)

In Figure 1, we see that the expected future global operating environment is characterized by persistent conflict, resulting in increased demand for quality Soldiers while we expect to simultaneously observe a future domestic operating environment characterized by decreasing supply. All the while, “the Army will require extraordinary strength in the moral, physical, and

cognitive components of the human dimension...existing accessions, personnel, and force training and education development efforts will not meet these future challenges.” Our research findings do not deviate from the expectations outlined in the Human Dimension study; we provide a systematic approach to better measure the desired strength in the moral, cognitive, and physical domains in order to improve the state of our knowledge for use in decision-making within this environment.

1.4. Decision Frame

As we sought out others working to understand quality, we found synergy with a group of consultants from McKinsey and Company working to advise the Accessions Enterprise. The Accessions Enterprise defined a set of Human Capital Strategy objectives, and McKinsey consultants advised that certain guidance was needed to ensure that critical decisions are aligned with the stated objectives. A central point was that this guidance needs to reflect the key tradeoff decisions between cost, mission numbers, and talent. While cost and mission numbers are easily quantified, talent/quality is not. The McKinsey consultants advised that the Accessions Enterprise must clearly define talent/quality, and that *talent/quality must be measured along a continuum* (McKinsey 2009). We concur with McKinsey’s recommendation, and point out that we must appropriately sample the entire population of Soldiers to develop a continuous measure.

In continued consideration of the frame, we wrestled with the ambiguity of words as “there is no greater impediment to the advancement of knowledge” (Reid 1785). We looked to define Soldier quality, but found this word increasingly troublesome. Quality means a “degree or grade of excellence,” or an “inherent or distinguishing characteristic; a property” (Random House 2009). Quality, in connotation, does not imply change. Because people can grow, learn, and change, quality is not the best descriptor of what we want from Soldiers. This sentiment was also expressed by GEN Thurman, known as the father of the All Volunteer Force, when he wrote that “maybe instead of quality, we should have used the term indicators of military enlistment success. However, for now we will leave the correction of our past mistakes to some future enterprising recruiting commander, policy maker, or researcher” (Thurman 1995).

The term ‘quality’ is troublesome and doesn’t necessarily indicate what the Army wants, but the term ‘indicators of military enlistment success’ is also troubling as it points to completion of the first term of enlistment. Completion of the first term is something that we are interested in, but points to the quantity of service rather than the quality of service. When referring to quality of service, personnel in the Army frequently use the terms potential and performance to write evaluations; these terms are a common framework. Potential means “capacity for growth or development” and performance means “the manner in which something fulfills its intended purpose” (Random House 2009). The word quality refers to a property known with certainty, but potential recognizes uncertainty and change. Performance is the realization of past potential, and we aim to maximize the development of recruit potential through catalysts such as effort, leadership, and training to achieve the Soldier performance we want.

MG Bostick agreed that the Army should speak about the issue with the terms recruit potential and Soldier performance rather than the term quality; this was later affirmed by LTG Freakley, Commander, United States Army Accessions Command (USAAC). In this study, the

frame (boundary) is around the measurement of Soldier performance. In alignment with the Accessions Enterprise, we desire to measure this performance along a continuum to better inform decisions. In alignment with the decision environment established by the Human Dimension study, we further specify that we want to measure Soldier performance in the moral, cognitive, and physical domains.

1.5. Knowledge Gap

Within the frame of Soldier performance, there exists an organizational knowledge gap. The reason that our study was initiated is because commanders and staffs at USAREC and USAAC struggle daily with this knowledge gap. Table 1, slightly modified from McKinsey (2009), is based on multiple Army Research Institute (ARI) and RAND reports; it provides a summary of the major current and considered metrics and the general ability of each to predict future longevity and performance of individual Soldiers:

Indicator	Longevity of Service				Level of Performance			
	IET Completion	6-Month Attrition	First-Term Attrition	Retention	E3/E4 Promotion	MOS Skills Test	Soldier of Year/QTR	NCOER Ratings
High School Graduation								
ASVAB/AFQT								
Age								
Height and Weight								
Fitness Test								
Employment Status at Entry								
Assessment of Individual Motivation (AIM)								
Work Values Information (WVI)								
Work Suitability Inventory (WSI)								
Predictor Situational Judgment Test (PSJT)								
Work Preferences Survey(WPS)								
Rational Biodata Inventory (RBI)								
Overall Ability to Predict Outcome								

Insufficient to Predict Outcome
 Sufficient to Predict Outcome

Table 1. Current indicators of Recruit Potential to Predict Longevity/Performance

Table 1 shows that we are best able to predict metrics associated with longevity, or quantity, of service. In contrast, we have a gap in our ability to predict the level of performance of service over this duration. Of the metrics related to performance in Table 1, the Army is only able to predict promotion to E3/E4 with some level of certainty; the authors observe that promotion to E3/E4 falls short of capturing everything we want in Soldier performance. As mentioned, leaders want to be able to indicate tradeoffs between cost, quantity, and performance for strategic decision-making. Cost and quantity are easily measured, but we have a gap in our knowledge relating to the indicators of recruit potential that will predict performance.

1.6. Problem Statement

The Army needs a model of Soldier performance in the moral, cognitive, and physical domains to inform a variety of strategic decisions in the Human Dimension to better recruit, assign, mentor, train, retain, and promote Soldiers. The model should serve to provide a living framework for discussion in the Soldier quality debate, define the attitudes and behavior that the Army wants from Soldiers, provide an endstate metric with distinction along a continuum for decision-making, and provide a tool for the holistic assessment, counseling, and mentoring of Soldiers.

2. METHODOLOGY

2.1. Difference of Approach

As established, there is a knowledge gap in the Army's understanding of performance. Most researchers' work in this arena focuses on developing entry metrics or indicating passage through a particular gate. The relevance of research is measured partially by the usefulness of results, and entry metrics are useful because we know them before making a hiring decision. In conversations with several researchers, we have heard anecdotes like "we did spend a few days at the start of the study defining our endstate," but have not seen any studies that use a holistic endstate metric (or response variable). The vast majority quickly jump to the longitudinal portion of studies because data is necessary to support decisions, this data takes time to generate, and time is always constrained. The longitudinal portion of the study is *urgent*, in that it "presses on us and insists on immediate action" (Covey 1989). Although many are eager to begin the longitudinal work, it is an egregious error as "most hiring decisions start off on the wrong foot because the company hasn't clarified exactly what it wants in the new hire" (Luecke 2002). The number one pitfall in decision support frameworks for DoD studies is there is a "lack of clear problem definition" (Dillon-Merrill et al. 2006). Defining the problem is *important*, or "contributes to your mission, to your values, your high priority goals" (Covey 1989). Most studies in the personnel arena too quickly move through the *important* task of defining the endstate and prematurely advance to the *urgent* longitudinal data collection effort.

In contrast, our effort has predominantly focused on measurably defining the endstate the Army wants with only a relatively small amount of emphasis on determining the entry metrics that will indicate it. This is similar to the idea that we should "begin with the end in mind" (Covey 1989). We did implement the model to gain initial insights into recruiting metrics and as a proof of concept; if the endstate model is accepted as a reflection of our values, then we can now move to investigate the indicators of potential longitudinally. Both Value-Focused and longitudinal studies are needed, and this study should now inspire longitudinal efforts such that we may gain insight into entry metrics that will indicate the potential to perform as a Soldier (see Ongoing Work).

Value-Focused Thinking (VFT) is a leading approach to making decisions with multiple competing objectives. It has been used as an approach to a large array of military problems, and has similar applicability in personnel decisions. For example, the military has used VFT to provide insight in many major acquisition decisions, evaluate courses of action, improve current

systems, evaluate future concepts, analyze force mix, justify resource allocation, reduce risk, and allocate training time (Parnell 2007). Recently, the Army has begun to widely employ value modeling for strategic assessments. At Multi-National Force-Iraq, VFT is employed in development of strategic plans in that they “proceed with strategic guidance and consult with subject matter experts aligned with the established political, diplomatic, rule of law, economic, and security lines of operation to develop a set of measures for use in decision-making” (Kucik 2009). Other units to employ value modeling for assessments include the U.S. Army Pacific in Hawaii (Vinton 2009), and the Combined Joint Task Force-82 in Afghanistan (Stewart 2009). Value-Focused Thinking is not new in the military, but it is not extensively used in the personnel arena. If we (the Army) truly consider Soldiers to be our most precious resource, and have multiple objectives when considering this resource, then we should employ VFT to better understand and address personnel decisions.

2.2. Value-Focused Thinking

2.2.1. Origins

VFT is a part of a broader field known as decision analysis: “a discipline comprising the philosophy, theory, methodology, and professional practice necessary to formalize the analysis of important decisions” (Howard 1983). Decision analysis emerged from operations research/management science and is a result of combining aspects of systems analysis and statistical decision theory (Howard 1968). In contrast to other analytical procedures from operations research/management science, decision analysis is unique in that not only does it *allow* subjective judgments from decision-makers, it *requires* them (Clemen & Reilly 2001). Also, decision analysis is *prescriptive*, or serves as a guide for what we should do, rather than *descriptive*, or providing an explanation of what we currently do. VFT is a *philosophical approach* to guide decision-makers (Keeney 1992), and this philosophy is underpinned by the *mathematical methodology* of multiple objective decision analysis (Keeney & Raiffa 1976).

2.2.2. Philosophical Approach

Keeney (1992) defined VFT, and there is a wealth of additional military and civilian literature on the topic; as such we only provide a short primer in this context. The first idea is that we would start with defining our values. They should be the basis for the time and effort we spend thinking about decisions and the driving force for our decision making. Thinking about our values results in a qualitative value model; this is usually represented in a value hierarchy consisting of the fundamental objective, functions, objectives, and supporting value measures (metrics). In contrast, most people/organizations react to decision problems by immediately focusing on the choice between alternatives (alternative-focused thinking) and fail to proactively recognize decision opportunities based on values as qualitatively encoded in things like mission statements, functions, goals, and objectives. The qualitative value model drives our development of a quantitative value model consisting of a value function as prescribed by multiple objective decision theory. The second major idea is that we should only move to generate alternatives after encoding our values both qualitatively and quantitatively; the alternatives generated will be better when they are based on opportunities realized through our values. Third, we should use

our quantitative value model to evaluate our alternatives. Keeney (1992) identifies nine benefits of VFT as displayed in Figure 2 (Jackson et al. 1997):

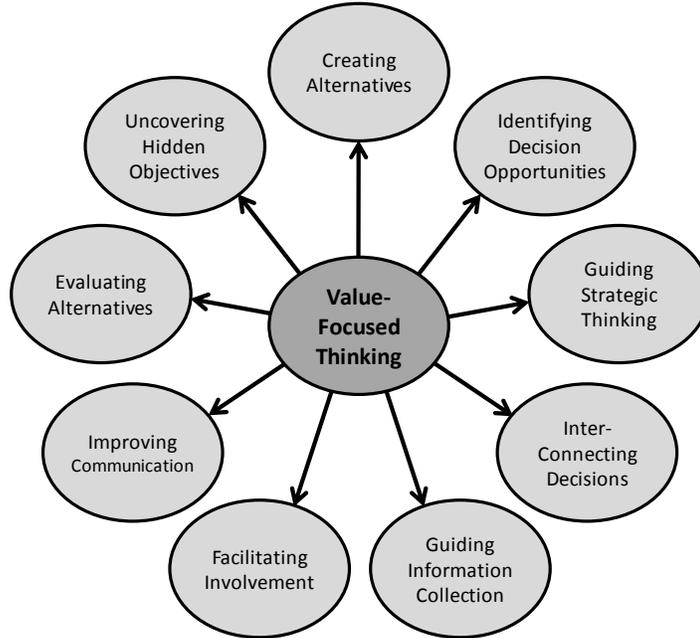


Figure 2. Benefits of Value-Focused Thinking

In particular, guiding strategic thinking, creating alternatives, and evaluating alternatives are particularly relevant to military operational analysis (Parnell 2007). In our work, we additionally find that VFT has improved communication by providing a clear framework for discussion, facilitating involvement by a diverse group of stakeholders, and guiding information collection.

2.2.3. Mathematical Methodology

The additive value model is the simplest and most commonly used mathematical model in multiple objective decision analysis (Parnell et al. 2008). The additive value model is given by the equation:

$$v(\mathbf{x}_j) = \sum_{i=1}^n w_i v_i(x_{ij})$$

where

- $v(\mathbf{x}_j)$ is the **total value** of alternative j ,
- $i = 1$ to n are the **value measures** specified in the qualitative value model,
- x_{ij} is alternative j 's **score** (raw data) on value measure i ,
- $v_i(x_{ij})$ is the **single-dimensional value** of alternative j on value measure i ,
- and w_i is the **swing weight** of value measure i .

Single-dimensional value functions measure returns to scale on the value measures (Kirkwood 1997), thus transforming raw data (scores) on different value measures with different units along the acceptable ranges (defined by minimum acceptable and ideal levels) into single-dimensional value for comparison. Swing weights are equal to the increment in value that is received from

moving the score on that value function from its minimum acceptable level to the ideal level (Parnell et al. 2008). They must sum to 1 and thus are a mutually exclusive and collectively exhaustive reflection of the relative importance of value measures as defined by their ranges. Through summation of weighted single-dimensional value achieved by each alternative on each value measure, we effectively calculate a weighted average that represents an alternative's total value. These are the basics of multiple objective decision analysis using the additive value model; much deeper explanations can be found in the references listed.

3. MODELING

3.1. Consultation

During the initial stages of problem definition, we developed a plan to seek input from many stakeholders. We began with MG Bostick, USAREC Commander, and numerous staff elements. We spent time with the authors of the Human Dimension Study in the Army Capabilities Integration Center (ARCIC) and Army Research Institute (ARI) researchers. We found synergy with McKinsey consultants advising the Accessions Enterprise. Additionally, we began to speak with people in parallel systems; Federal Bureau of Investigation (FBI), Air Force, Naval Special Warfare (SEAL) School, and Marine personnel all provided valuable ideas. After developing an initial model, we began to consult with a diverse group of stakeholders within the Army to include Recruiters, Drill Sergeants, Platoon Sergeants, First Sergeants, Company Commanders, Command Sergeants Majors, and Special Forces Team Leaders. With more resolution, we consulted with a variety of subject matter experts at the United States Military Academy (USMA) to include individuals in the Department of Behavioral Sciences and Leadership, the Department of Physical Education, the Department of Military Instruction, the Army Center of Excellence for the Professional Military Ethic, the Center for Company Level Leaders, the Office of Economic and Manpower Analysis, the Office of Admissions, and the Office of Plans, Policy, and Analysis. In this effort, we gained significant insight into the organization of attributes. With our initial model, we consulted with personnel in the 3rd Brigade, 1st Cavalry Division to conceptually verify the model in a focus group of 48 sets of Platoon Leaders and Platoon Sergeants. Upon verifying the model, we conducted an initial operational test with 13 platoons (n=195 Soldiers) as described in later sections.

3.1.1. WholeSoldier Performance Attributes

Figure 3 displays our final functional hierarchy of WholeSoldier Performance attribute groupings in the moral, cognitive, and physical domains.

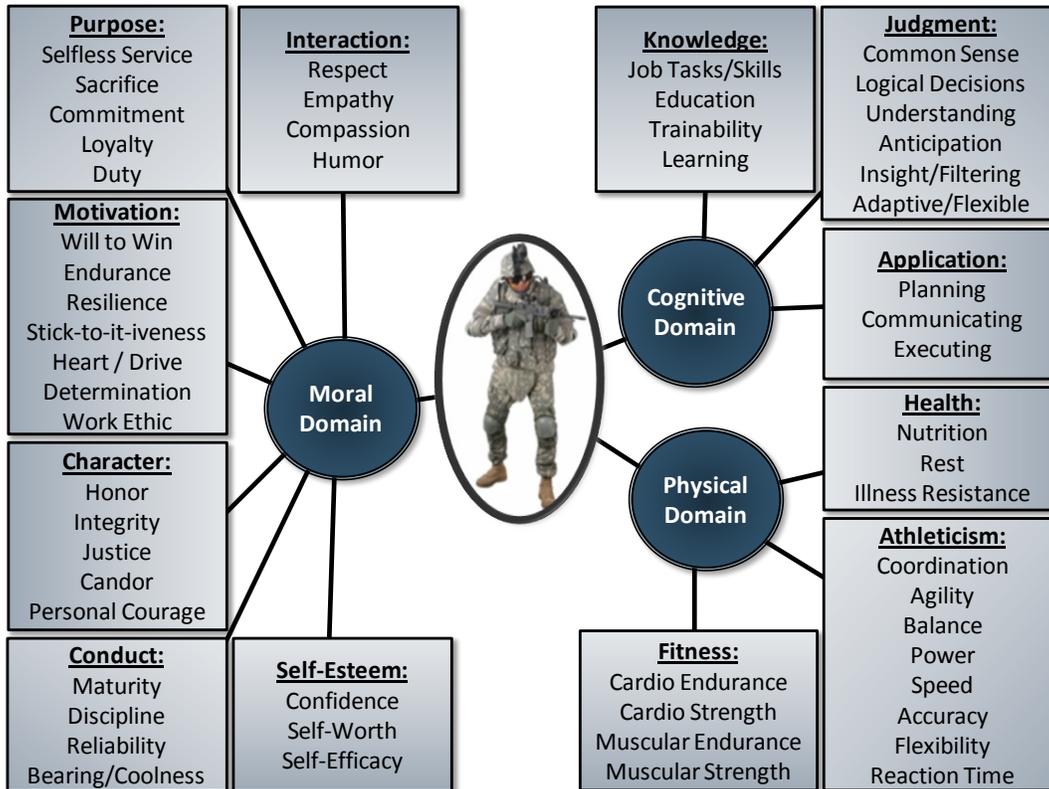


Figure 3. WholeSoldier Performance Attributes

Much effort in our consultation has centered on the question “What specifically do you mean by that?” In line with VFT, we translate or decompose organizational jargon into the underlying attributes indicated. As an example of such translation, our favorite piece of NCO wisdom related to learning ability; one Platoon Sergeant was adamant that we (the Army) needed to stop sending him “Rock Farmers.” We accept definitions of the moral, cognitive, and physical domains from the Human Dimension Study (TRADOC 2008). It is important to note that the attribute groupings are not academically defined, but rather defined as readily understood by those in the operational force who are called to lead and assess the performance of Soldiers.

3.1.1.1. Moral Domain

Purpose relates to why a Soldier does things. The main sentiment of those consulted centers around selfish versus unselfish attitudes. The Army Value of selfless service indicates that Soldiers are willing to put the needs of the nation and Army above their own. They are committed and loyal to the ideals of the organization and are willing to sacrifice to perform their duty to fulfill their obligations. A Soldier’s purpose is not evident through the observation of only one action, but rather is revealed to all around through a series of actions that would indicate an attitude of selfishness or selflessness.

Motivation relates to the level of effort that Soldiers demonstrate to accomplish the mission. We desire strong-hearted Soldiers that display the immediate determination and drive required, the endurance and work ethic to see things through, and the resilience to bounce back from setbacks. Phrases from the Ranger Creed (USAIS 2006) like “one hundred percent and then

some,” “will fight with all my might,” and “readily will I display the intestinal fortitude required” do a good job of defining the organizational value placed on motivation.

Character relates to the manner in which Soldiers accomplish the mission. We have repeatedly heard that Soldiers should possess the honor and integrity to do the right thing when nobody is looking, they should possess the personal courage to do the right thing even when it is uncomfortable or dangerous, and they should always be candid without ever entering the grey areas of half-truths or lies of omission.

Conduct relates to how Soldiers carry themselves. We desire Soldiers that display maturity and discipline leading to a balanced life. When frustrated, they are able to keep their bearing and be a part of the solution. When the situation is tenuous and the odds are stacked against us, we desire Soldiers that display the coolness of mind to remain rational; some have described coolness as a Soldier’s ability “to keep all of their marbles in the jar.”

Interaction characterizes the attitudes that a Soldier demonstrates towards other members of the team. The first level baseline expectation is that Soldiers always display respect towards others. In addition to respect, leaders say they want Soldiers that show empathy and compassion for their comrades; this type of Soldier makes others comfortable and fosters strong relationships. Finally, we want Soldiers that possess a strong sense of humor; many conversations have centered on the value of humor to bring a group together in tough times. The Soldier that consistently interacts with others positively is in high demand.

Self esteem characterizes the attitudes that a Soldier holds concerning himself/herself. This is quite possibly the toughest attribute grouping to assess as these attitudes/feelings are often not socialized, but rather are evidenced through a sum of small actions over time. A leader that is in tune with his/her Soldiers and interacts with them constantly is in the best position to understand a Soldier’s attitudes towards self. We desire Soldiers that display an appropriate confidence in their actions, possess the self-efficacy to believe that they can make an impact, and also believe in their intrinsic worth.

3.1.1.2. Cognitive Domain

Knowledge refers to the information possessed by Soldiers and their ability to assimilate additional information. Relating to the information currently possessed, we desire Soldiers that have a mastery of their specific job tasks and a strong basis in general education. Relating to new information, we desire Soldiers that are life-long learners and are easily trainable, meaning they have the ability to receive instruction and store new information. In consultation, and in many documents reviewed, the complexity of the battlefield is emphasized and we want Soldiers with the capacity to store large amounts of information.

Judgment refers to a Soldier’s ability to effectively process information and make logical decisions. With the information they have, Soldiers should understand what is relevant, filter out the irrelevant, and gain insight into situations through a systematic thought process. This insight should lead to proactive anticipation of future events, and we desire Soldiers that are adaptive and flexible in a variety of situations based on their understanding of the situation. The desire

for “common sense” is related but distinct, in that it relates to a Soldier’s ability to make routine decisions in situations that are often encountered; solutions in these situations could be considered readily apparent.

Application refers to a Soldier’s ability to translate decisions into effective actions. Once a decision has been made, we desire Soldiers that can develop a plan to accomplish the desired endstate. Once the plan is constructed, we additionally expect Soldiers to be capable of communicating the plan with others; a great plan is nothing if we can’t communicate it with others involved. Finally, we desire Soldiers that have the cognitive ability to carry out a plan. In this regard, we want Soldiers that continually move through the cycle of assessing relevant information, displaying sound judgment, and executing to achieve the desired endstate.

3.1.1.3. Physical Domain

Fitness indicates that Soldiers are fit in the traditional sense of the word. In academic settings, this is referred to as the health-related components of fitness. These components are somewhat measured with the current Army Physical Fitness Test (APFT), and include cardiovascular and muscular endurance and strength. In the past, this has been the primary measure of fitness in the Army, but over the past decade there has been a growing understanding that there are also other things that we want in the physical domain.

Athleticism can be considered functional fitness, and was consistently the first set of attributes mentioned in the physical domain during our consultation. In this area, we draw heavily from the general physical skills (Glassman 2002) outlined by CrossFit®, a fitness program that is spreading like wildfire through the ranks of military forces, police forces, professional athletes, and even the elderly who desire to regain functionality critical to normal life. The majority of all special operations forces and combat arms branches now incorporate this program, or another based on it, in their training regimen. In addition to the attributes listed under general fitness, we desire Soldiers that possess high coordination, agility, balance, power, speed, accuracy, flexibility, and low reaction time.

Health indicates that Soldiers maintain their bodies in accordance with well-known principles of rest and nutrition. Nutrition and rest play major roles in energy levels, resistance to illness, and body composition. A Soldier that does not maintain their body like any other system is prone to low energy, injuries, and sickness. In consultation, leaders value Soldiers that are consistently able to perform physically based on sound maintenance, and are very frustrated with those that do not maintain their bodies and become “Sick Call Rangers.” Proper rest and nutrition are essential components of Soldier performance in the physical domain.

3.1.2. Measurement of Attribute Groups

Kirkwood (1997) describes value measures as either *direct* (directly measure attainment of objective) or *proxy* (measures associated objective). Additionally, value measures have either a *natural* (commonly measured in nature) or a *constructed* (developed to indicate objective) scale. Parnell (2007) concludes that directness is more important than scale when developing value measures and that one direct constructed measure can replace a multitude of natural proxy

measures. Without existing direct natural measures for the attribute groupings in WholeSoldier Performance, we established direct constructed measures.

In consultation about performance on each of the attribute groupings, we first noticed that nearly all interviewees and focus group participants generally spoke in terms of good, bad, and neutral performance. Second, their descriptions of behavior routinely provided three levels of distinction on good and bad performance. Third, these distinctions on levels of good and bad performance were often stated by using modifiers in speech that related to frequency of behavior, severity of impact, or common jargon. In developing a constructed scale, we utilized these commonly used modifiers to develop the constructed scale levels in Table 2 within the mental framework of those called to assess Soldiers:

Bad			Neutral	Good		
1	2	3	4	5	6	7
“Always”	“Most of the time”	“Sometimes”	“Neutral”	“Sometimes”	“Most of the time”	“Always”
“Unacceptable”	“Very Bad”	“Bad”	“Just Enough”	“Good”	“Very Good”	“One of the best”
“Separate”	“Problem Soldier”	“Needs some work”	“Only what is required”	“Bit more than standard”	“Solid Performer”	“Example for others”

Table 2. Constructed Scale for WholeSoldier Attribute Groupings

When using these common modifiers on performance levels, assessors expressed great confidence in the levels assigned on any particular attribute grouping. For each attribute grouping, we also gave examples of good, neutral, and bad behavior as shown in Appendix A, a Draft WholeSoldier Developmental Counseling Form.

3.1.3. Weighting of Domains and Attribute Groups

With an established scale for assessment on all attribute groupings, we sought to elicit swing weights, or the relative importance of attribute groupings across the range of the common scale. To accomplish this often difficult task when consulting with a large group of stakeholders, we employed two techniques: direct questioning and correlation analysis for verification. When elicited in a top-down questioning approach to weighting, leaders in the Army find that the moral domain is the most important; the general sentiment was “Sir, if these boys show up with heart, then I can train their bodies and minds.” They encounter far more variation in the moral domain than in the physical and cognitive domains, and the moral domain is the source of most problems. This variation in the moral domain is consistent with the fact that we currently screen primarily in the cognitive and physical domains when assessing recruits. When elicited in a bottom-up questioning approach, attribute groupings in the moral domain were generally evaluated as relatively more important in a fashion consistent with the top-down approach. After arriving at a set of initial swing weights through direct questioning, we later verified them through a correlation analysis in which we compared the correlation of attribute grouping scores to the elicited holistic performance score (described in section 3.3). In sum, leaders were consistent in their spoken word and the quantitative assessments provided; Table 3 provides the WholeSoldier Performance swing weights (as percentages) for domains and attribute groupings:

Moral 56%						Cognitive 26%			Physical 18%		
9%	10%	9%	10%	10%	8%	8%	9%	9%	6%	6%	6%
Interaction	Purpose	Motivation	Character	Conduct	Self-Esteem	Knowledge	Judgment	Application	Fitness	Athleticism	Health

Table 3. WholeSoldier Swing Weights

Much like the attribute groupings themselves, the swing weights in Table 3 are defined by our primary stakeholders in the operational force rather than academicians. In the modeling of preferences for decision making, the primary source of validation is in the concurrence of stakeholders.

3.2. Assumptions

3.2.1.1. Attribute Groupings

Parnell et al. (2008) presents seven qualities of useful models; several of these qualities are particularly relevant to this work. *Parsimony* and *simplicity* are desired as a simple model is easier to understand, explain, and implement; creativity and effort can result in a simply elegant model of a complex system. In contrast, *accuracy*, *robustness*, and *fidelity* relate to a model's ability to represent the actual system *complexity*. In WholeSoldier Performance, we define attribute groupings for which a single score will be elicited. As heard from academicians, ideally we would measure attributes separately as the individual attributes in each grouping are slightly different. Leaders in the operational force state that asking a rater to assess Soldiers on more than 60 attributes would create an infeasible organizational burden. We carefully considered the attribute groupings to find a balance of complexity and simplicity with the aim of usefulness.

3.2.1.2. Mutual Preferential Independence

As discussed by Kirkwood (1997), the most important assumption of an additive value model is that the value measures are *mutually preferentially independent*, which in simple terms means that the value provided on one measure does not preferentially depend on the scores from other value measures. If two value measures do not satisfy this assumption, then in modeling we can simply combine the two value measures into one and then use the additive value model (Ewing et al. 2006). In the WholeSoldier model, preferences are decomposed such that the value provided in one attribute grouping does not depend on the scores from other attribute groupings.

3.2.1.3. Linear Value Functions

As mentioned, value functions measure returns to scale on value measures. For each of our attribute groupings (value measures), we have assumed a linear value function that scales the lowest assessment to a value of 0 and the highest assessment to a value of 100. This means that the difference in value provided between levels of performance is constant. This assumption is primarily meant to increase the understandability of the model for the everyday user, but could

easily be adjusted to account for non-linear value functions if additional work proves the linear assumption invalid.

3.2.1.4. Positive Swing Weights

In WholeSoldier Performance, all attribute groupings are given in a manner such that a higher assessment score indicates better performance. Thus, we assume that in order to be palatable within the norms of the Army, that all of the attribute groupings must have positive swing weights for use in the additive value model. For instance, if a Soldier is assessed to display outstanding motivation, then this will always add to his/her WholeSoldier Performance. This assumption concerning the palatability of swing weights drove the use correlation analysis rather than regression for verification of weights, as regression often results in negative coefficients.

3.3. Data Collection

We conducted an initial operational test of WholeSoldier Performance with 13 platoons (n=195 Soldiers) from 3rd Brigade, 1st Cavalry Division. Entire platoons participated, and the first author facilitated WholeSoldier Performance evaluations with the Platoon Leader, Platoon Sergeant, and Squad Leaders. This group of individuals assessed the WholeSoldier Performance of all junior enlisted Soldiers in the platoon. The first phase was to assess all Soldiers on each WholeSoldier attribute grouping, one attribute grouping at a time. The second phase was to assess all Soldiers holistically through an iterative progression of pairwise comparisons, resulting in a holistic performance score between 0 and 100 for all Soldiers in the platoon.

While assessments took place, research assistants administered a questionnaire with 104 questions to all junior enlisted Soldiers in the platoon. The first questionnaire section addressed individual attitudes, while the second addressed past experiences. The majority (85 out of 104) of the responses to the questions were ordinal in nature. Most of these have five levels, i.e. Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, and Strongly Disagree. A few questions have four or six possible responses or are rank-ordered. However, there are also a significant number of questions with nominal or categorical data for responses, each with five to nine levels.

For the same 195 Soldiers who completed the potential questionnaire, and whose leaders rated their WholeSoldier performance, USAREC provided us with recruiting data. Once again, the level of measurement in this data includes categorical and ordinal responses, but also includes some questions that are interval or ratio in nature. Examples of this data include: zip code, age, marital status, education level, ASVAB/AFQT scores, and other demographic information.

3.4. Data Analysis

Although predicting WholeSoldier Performance is not the central focus of this work, we are interested in examining differences in WholeSoldier Performance based on the questionnaire and recruiting data as a proof of principle. We employ one-way Analysis of Variance (ANOVA), the

purpose of which is to examine the differences among the mean of two or more populations. Some assumptions should be met in order to employ one-way ANOVA for a true comparisons of means: 1) the data collected should be normally distributed across the sample population; 2) sample cases should be independent of each other; and 3) the variance between the groups should be approximately equal (homogeneity). Examination of our predictors for these assumptions supports the use of ANOVA. Greater details on this technique can be found in Cardinal & Aitken (2006) and Turner & Thayer (2001).

Depending on the desired level of significance, the number of questions found to be statistically significant as predictors is shown in Table 4. Few questions were found to be very good predictors (i.e. at a significance level of $\alpha \leq .01$) for either the individual domains or WholeSoldier Performance. Raising the level of significance to a higher value (like $\alpha = .05$ or $.10$) is not unreasonable. The selection of α involves a tradeoffs in our risk tolerance for Type I (false positive) and Type II (false negative) errors. Since the model from this small data set could be used for a large number of decisions, we argue for less risk tolerance with respect to Type I error.

Level of Significance (α)	Moral	Cognitive	Physical	WholeSoldier
.001	1	1	1	1
.01	7	5	3	5
.05	12	16	12	13
.10	22	25	19	22

Table 4. Number of questions at varying significance levels

We next built multiple (predictor) linear models with each of the indicators found to be significant individually. We performed a stepwise regression on each of these linear models, focusing on backward eliminations, starting with all candidate variables and testing them one by one for statistical significance, deleting any that are not significant. Regardless of which level of significance we started with, the models all ended up as statistically significant, with between 5 and 8 predictors and a coefficient of determination (R^2) of between .25 and .27. In other words, these models account for between 25% and 27% of the variation in the WholeSoldier Performance with only 5 to 8 of the indicators being used. While this seems like a relatively low percentage of the variation in performance explained, this is not unusual for human performance models. The predictors found most useful are presented in section 4.3 as initial insights. Once again, we highlight that our primary focus is to define/measure the desired endstate rather than to predict it; see section on ongoing work for further development of a model to predict WholeSoldier Performance.

4. RESULTS

4.1. WholeSoldier Individual Performance Report

The first result of WholeSoldier Performance assessments is a possible improvement to a rater's ability to mentor a subordinate through counseling. Using the multiobjective model, raters' assessments are transformed into value in the moral, cognitive, and physical domains. These elements of value are combined to generate a holistic WholeSoldier value. For mentoring conversations, we represent all data elements within the WholeSoldier Target shown in Figure 4:

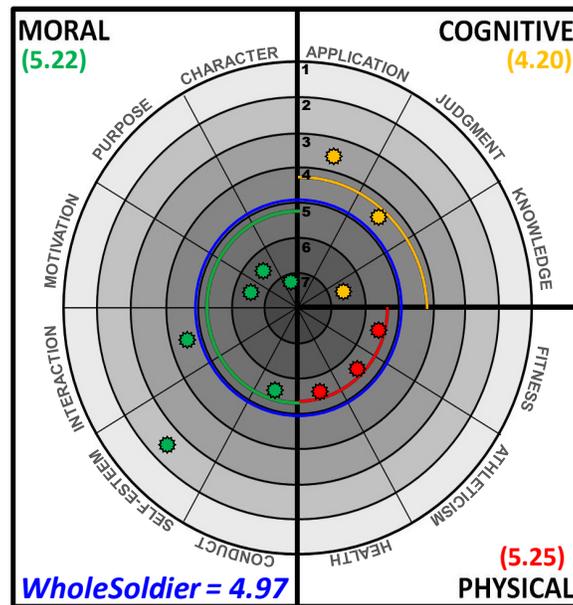


Figure 4. Infantryman #24 WholeSoldier Target

This WholeSoldier Target is populated with data from Infantryman #24 in our study. We can read off the rater's assessments on each attribute grouping; these assessments form the subordinate's shot group. A tight shot group on target indicates strong performance, not unlike the desired shot group on a rifle target. The arc segments generated in each domain represent the value achieved in the respective domain, and the circle represented in blue denotes the overall WholeSoldier value achieved.

With the WholeSoldier Target, it is easy to both counsel a Soldier and to understand the Soldier's performance with much higher fidelity than any currently existing system in the Army. For instance, the platoon sergeant expressed the following (paraphrased) sentiments to Infantryman #24:

Based on your performance over the past few months, I'm able to make some observations. In the moral domain, I greatly appreciate your impeccable character and the fact that you are both selfless in purpose and highly motivated to accomplish the mission. Your conduct is additionally pretty balanced and mature, but I have noticed that you sometimes have problems interacting with the team. Additionally, some things that you have said and done, along with your general disposition, indicate that you don't really have much confidence or the feeling that you are a valuable team member. I think that I may know where these feelings come from when I evaluate your performance in the cognitive domain. You and I both know that you are all over your required knowledge and tasks, but it seems like you have difficulty using this knowledge to make decisions in situations that are constantly changing. This is also reflected in the fact that you sometimes need a bit of work in planning and execution once a decision is made. Relating this back to the moral domain, I think you understand these difficulties and that this drives your low-self esteem. Over the next few months, we are going to work together to help you improve your judgment, application, and interaction with the team.

I think, and I'm sure you concur, that this will help to boost the perception you have of yourself. It will also help the team to better accomplish the mission. Finally, you continue to be one of the stronger guys in the platoon when it comes to physical stuff. You seem to have good diet and rest habits, and you always do well in PT and other training; keep it up.

When looking at WholeSoldier data, we often find ourselves getting a sense that we “know” the Soldier in question. As discussed ongoing work, the Draft WholeSoldier Counseling Form in Appendix A is currently being used to mentor a set of Soldiers in Initial Entry Training. We believe that the mentoring benefits alone are enough to justify a simple implementation of WholeSoldier Performance.

4.2. WholeSoldier Population Data

In addition to viewing the data on one Soldier, we can easily view the data for populations. Figure 5 is four platoons worth of WholeSoldier data from 3rd BCT, 1st CAV. Each row in the data corresponds with one Soldier (names deleted), and provides both their ratings on each attribute grouping and the value achieved in each of the domains as well as holistically. The data has been formatted such that higher ratings are green and lower ratings are red. Lastly, the Soldiers have been ordered in descending order based on WholeSoldier Performance.

NAME	Purpose:	Motivation:	Social:	Conduct:	Character:	Self Esteem:	Thought:	Capability:	Knowledge:	Physical:	Medical:	Enlisted Total	Moral	Cognitive	Physical	Total	Rank		
	7	7	7	7	7	7	7	7	7	6	7	100	59	25	15	98	9520	1	
	6	6	6	6	6	6	6	6	6	6	6	95	55	20	10	93	8472	2	
	6	6	5	6	7	6	6	6	6	7	6	95	51	21	10	87	9789	3	
	6	6	5	6	7	5	6	6	7	7	5	95	50	22	14	86	8244	4	
	6	6	5	6	7	5	6	6	7	6	5	95	49	23	10	85	8281	5	
	7	6	5	7	7	5	6	5	5	5	6	90	50	19	13	84	6554	6	
	7	6	6	3	6	7	6	6	6	7	5	95	49	21	14	84	6396	7	
	5	4	6	6	7	6	7	6	6	4	4	90	46	20	9	78	4916	8	
	5	5	5	6	5	6	5	6	5	6	5	85	45	20	14	78	2744	9	
	6	6	4	6	6	6	5	4	4	6	6	95	48	16	14	77	7262	10	
	5	6	5	5	6	6	4	5	5	6	5	80	46	16	13	76	7643	11	
	5	6	5	5	6	4	5	5	6	6	5	75	46	16	14	75	7378	12	
	5	6	5	5	6	5	4	5	4	6	6	70	45	16	14	74	4603	13	
	6	6	3	7	7	3	3	5	4	5	6	80	47	14	13	73	8387	14	
	5	6	6	6	4	6	4	4	5	5	6	85	46	15	13	73	7372	15	
	6	5	6	6	7	5	4	4	4	6	3	75	46	16	7	73	1613	16	
	3	3	6	6	6	6	7	7	7	7	4	45	42	26	7	72	8442	17	
	6	6	4	5	6	3	4	5	5	5	6	70	44	16	13	72	5924	18	
	5	5	5	5	5	5	5	5	5	6	7	42	42	18	13	72	4584	19	
	5	5	5	3	6	7	4	5	6	5	5	75	43	18	12	72	2347	20	
	6	5	6	4	6	5	4	4	5	5	5	70	40	16	12	71	8844	21	
	5	5	3	5	6	5	4	5	5	5	7	60	42	16	14	71	7683	22	
	5	6	4	4	5	5	6	5	4	6	5	70	41	18	13	71	5469	23	
	6	6	4	5	6	5	4	5	5	5	6	75	40	16	12	70	9762	24	
	5	6	4	5	5	5	4	5	4	5	6	65	43	16	13	70	4193	25	
	5	5	4	5	6	4	5	6	4	5	4	60	42	17	11	69	7193	26	
	5	5	5	4	5	4	5	3	7	5	6	60	37	14	10	67	5545	27	
	5	6	4	4	4	3	4	4	5	6	6	60	37	10	14	66	3784	28	
	5	3	7	2	6	6	6	5	3	4	5	55	40	16	10	66	2992	29	
	4	5	5	4	5	5	4	5	4	4	6	60	39	18	8	66	6722	30	
	5	6	5	4	3	5	4	3	3	6	5	60	39	12	13	63	6387	31	
	4	4	4	4	4	4	4	5	5	5	6	60	34	16	13	62	8163	32	
	5	4	4	4	5	4	4	5	4	5	4	65	37	15	11	62	7689	33	
	5	4	4	3	6	5	4	4	4	7	7	40	31	15	10	62	2860	34	
	3	3	5	4	4	7	5	5	6	5	7	60	36	18	8	61	5160	35	
	4	4	5	4	5	4	3	4	4	3	5	50	36	13	9	59	8584	36	
	4	4	3	4	5	3	3	4	3	7	7	70	33	9	16	58	9814	37	
	6	5	2	6	5	3	1	3	4	4	6	40	36	9	11	58	9750	38	
	4	4	4	4	4	4	4	4	4	4	4	50	34	14	9	57	1429	39	
	3	3	5	4	5	5	4	4	4	4	5	40	35	15	7	56	9037	40	
	4	4	4	4	4	4	4	4	4	3	4	30	34	14	8	55	8355	41	
	4	5	3	4	4	3	3	4	3	4	5	45	33	12	10	55	6045	42	
	4	5	3	6	3	4	5	4	2	5	5	30	29	14	12	54	9897	43	
	4	4	3	4	4	4	4	4	5	2	4	25	33	16	7	54	6454	44	
	6	5	3	4	4	5	7	7	7	7	3	20	26	22	6	53	9165	45	
	4	5	3	3	4	4	4	4	4	4	5	30	33	9	10	52	9169	46	
	4	3	3	4	4	3	5	5	5	2	2	30	30	18	6	52	2595	47	
	4	3	3	3	4	3	4	3	5	6	25	26	12	14	51	2620	48		
	3	4	5	3	4	3	4	4	3	4	4	40	30	13	9	51	9524	49	
	4	4	4	2	3	4	4	4	4	4	4	35	27	14	9	51	1488	50	
	5	4	5	5	5	2	3	4	3	5	7	20	25	12	14	49	8918	51	
	3	5	5	3	4	3	4	3	4	3	4	30	30	12	9	47	8862	52	
	3	5	4	3	5	3	4	3	4	6	10	28	17	11	46	9172	53		
	2	5	3	2	4	5	5	5	4	4	2	18	18	9	3	44	4711	54	
	2	3	3	3	3	3	3	3	3	6	10	21	12	10	4	42	8184	55	
	3	4	3	4	4	4	4	4	4	4	20	20	20	4	3	39	6060	56	
	1	1	5	1	1	4	4	4	4	2	2	10	16	14	5	34	8892	57	
	2	3	3	1	1	3	5	3	5	3	1	5	10	5	5	31	9731	58	
	1	1	5	1	1	2	1	1	1	1	1	1	1	1	1	1	20	1264	59
	1	1	5	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1070	60
	1	1	5	1	1	2	1	1	1	1	1	1	1	1	1	1	1	969	61

Figure 5. WholeSoldier Population Data for Four Infantry Platoons

First, it is plain to see that WholeSoldier Performance provides a continuum on performance across populations. In fact, there are $7^{12} \approx 13.8$ billion possible combinations of ratings for any given Soldier. This data could be used in a multitude of ways by leaders in the force. We discuss several of the possible strategic insights later, but it is also easy to see how leaders at the

tactical level could use this data. For instance, a battalion Command Sergeant Major could develop a strategy to target top performers for reenlistment or for Soldier of the Quarter boards. In contrast, this same Command Sergeant Major could better understand the population of “Problem Soldiers” that are causing problems at the company level. These are specific examples, but WholeSoldier Performance will inform an entire class of decisions in which the performance of Soldiers is relevant. The point is that defining our endstate with WholeSoldier Performance allows us (the Army) to understand the performance of both individuals and populations as we decide.

4.3. Immediate Recruiting Insights

Throughout our Army careers and this research, we have encountered numerous anecdotes concerning the tradeoff between performance and mission numbers. For example, Drill Sergeants express a common sentiment, “Sir, I can tell you who the ‘Problem Soldiers’ are during the first part of basic training, but I can’t get rid of anybody... I hate sending some of these guys out to units because I wouldn’t want them in my platoon.” Similarly, numerous Platoon Sergeants say something to the effect of, “Sir, I would rather take 28 squared away Soldiers to combat than take all 30 with 2 of them being ‘Problem Soldiers.’” In general, our NCOs are united in saying that the quality vs. quantity tradeoff is a problem in the Army today. Every group of Drill Sergeants and Platoon Sergeants that we spoke with expressed these sentiments, and their tone is very frustrated when they talk about this topic. At times, we felt more like counselors than researchers when discussing this subject with them; we are compelled to record this feedback from nearly every NCO that we spoke with.

However, with the data collected during this work, we can quantify some of the insights that are obvious to our NCOs. For example, the AFQT is in common use today as a measure of quality. But, the data in our sample indicates no apparent relationship between cognitive performance as evaluated in units (which is different from an academic definition), and AFQT score, as shown in Figure 6.

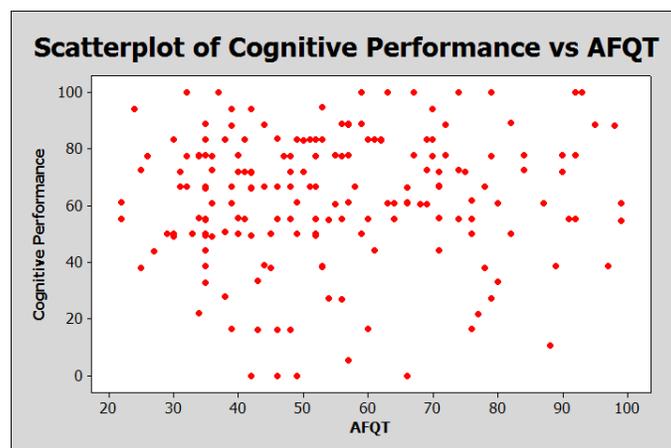


Figure 6. AFQT and WholeSoldier Cognitive Performance.

What might this be telling us? Two possible interpretations come to mind. First, the AFQT, which has been shown to be an indicator of retention (or quantity), may not actually be a good predictor in terms of what we want in Soldier performance (quality). Also, when viewed in light

of an NCO's comment, "Sir, I care a lot more about common sense than I do about book smarts," this may indicate that there are better ways to measure cognitive performance. The other predominant measure of quality currently in use, high school graduation, is thought to be an indicator of success. In our limited data set (n = 195), it appears that high school graduation is an indicator of performance, but is not statistically significant. In Figure 7 below, we show an interval plot that reflects 90% confidence intervals on the performance of high school graduates and non-high school graduates. Because the confidence intervals overlap, we are not able to claim that differences in average performance based on high school graduation are statistically significant. We believe that with more data, the confidence intervals constructed for this variable may shrink to the point where high school graduation is a statistically measure of performance.

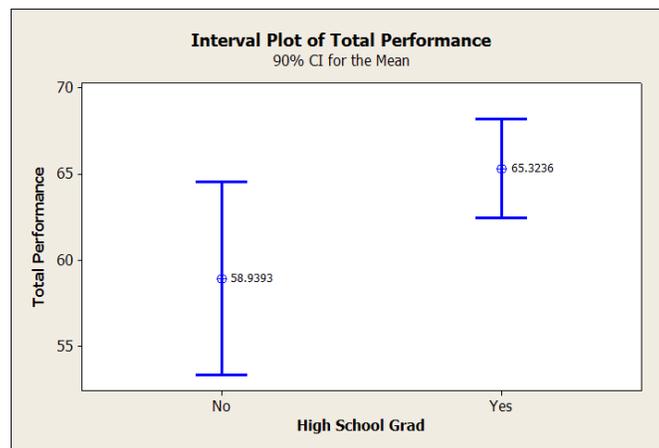


Figure 7. High School Graduation as an indicator of Total Performance.

Although the first question on our questionnaire, regarding the primary reason for joining the Army did not reveal any insights, the second question (on their second most important reason for joining) did display statistically significant differences as indicated by the horizontal red line in Figure 8 that indicates non-overlapping confidence intervals. This is not unexpected. In these types of questions, there is often a social desirability bias present, where the first reason given is the one that the respondent believes is expected or desired. (van de Mortel 2008) Then, in the secondary question, the respondent is less guarded and the true response comes out. Those reporting "service to Nation," "tough challenges," and "good people/friends" as their second most important reason for joining the Army have significantly higher WholeSoldier scores than those who responded "steady paycheck," "college benefits," or "a fresh start in life." Note that the responses predictive of positive (confidence interval above red line) performance are shown with green text, while the responses predictive of negative (below the red line) performance are shown in red text. While pay and benefits as recruiting and marketing tools may do a good job of impacting the quantity of Soldiers attracted, when considering quality, we would desire people who join for national service, tough challenges, and the camaraderie of other good people.

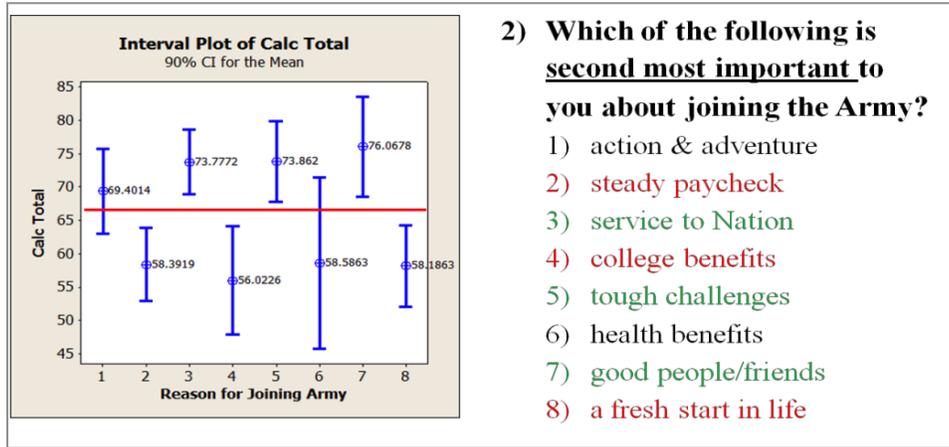


Figure 8. Reason for Joining Army as an indicator of Total Performance.

2) Which of the following is second most important to you about joining the Army?

- 1) action & adventure
- 2) steady paycheck
- 3) service to Nation
- 4) college benefits
- 5) tough challenges
- 6) health benefits
- 7) good people/friends
- 8) a fresh start in life

It has been said that, “Soldiering is a young person’s game and a contact sport.” In this light, one might expect that participation in athletics would be an indicator of performance. Part of our questionnaire asked Soldiers how many seasons of varsity or junior varsity team sports they played. We found that their response to the question in Figure 9 was a useful indicator of physical performance evaluations. Those who had played fewer than seven seasons of varsity or JV team sports during their high school years were rated as having a statistically significant lower level of physical performance than those who had played more than nine seasons. Also, we found that participation in team sports is a valuable indicator not just for physical performance; it extends beyond just the physical domain. As CSM Pippin and COL Volesky, from the 3rd BCT, 1st Cavalry Division intuitively stated, “We want athletes.”

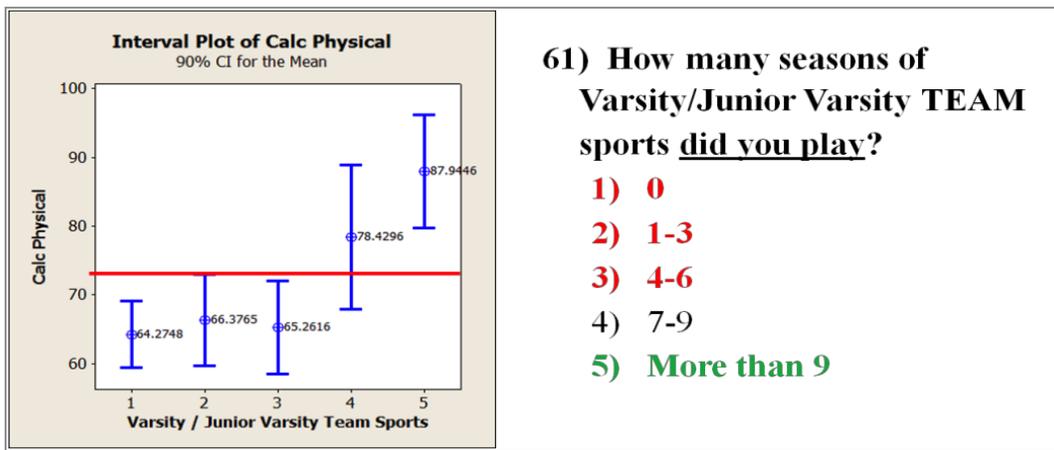


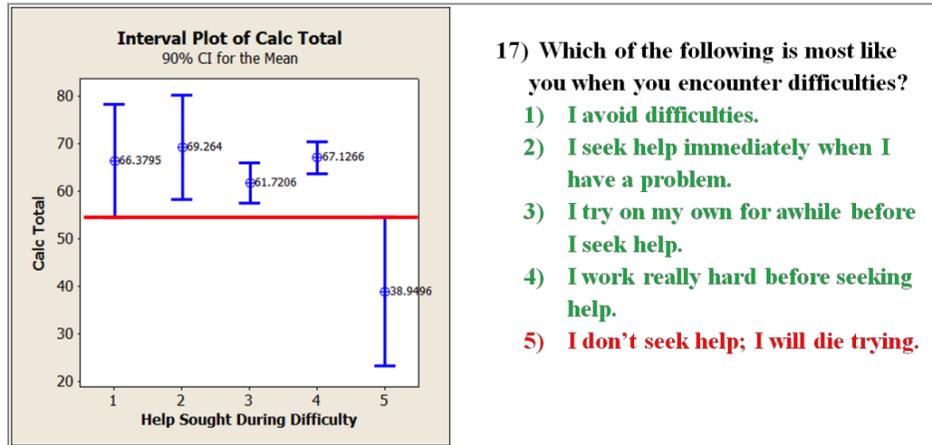
Figure 9. Team Sports Participation as an indicator of Physical Performance.

61) How many seasons of Varsity/Junior Varsity TEAM sports did you play?

- 1) 0
- 2) 1-3
- 3) 4-6
- 4) 7-9
- 5) More than 9

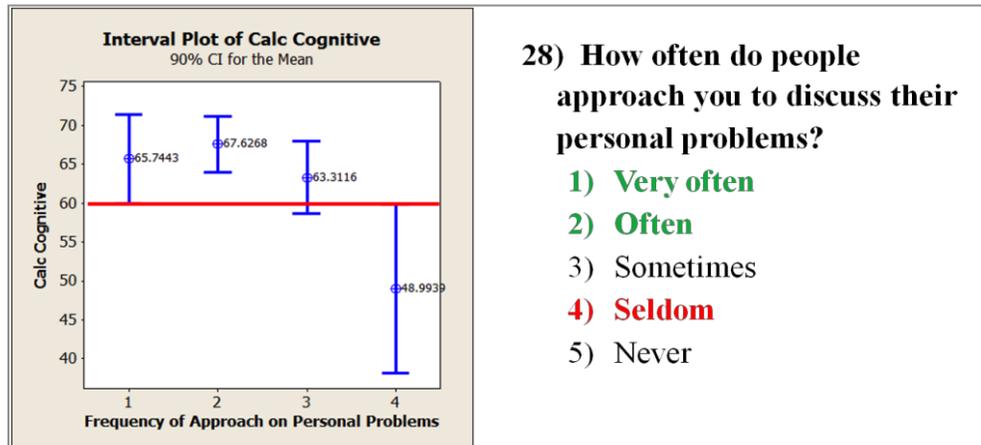
Two of our findings and resulting insights are related to one another— a Soldier’s attitude towards seeking help and also the frequency with which they are sought out for help are both significant with regard to overall performance, as well as performance in the cognitive domain. Soldiers who respond, “I don’t seek help; I will die trying” have a much lower WholeSoldier score than those who report that they are willing to seek assistance when they encounter difficulties. This is true whether they seek help immediately, after a little while, or only after working really hard. However, the fact that those who report total self-reliance do not perform

well is indicative of teamwork being a must. In other words, excessive self-reliance during times of difficulty may indicate an inability to perform well on a team whose mission has inherent difficulty. Also, the frequency with which a Soldier is sought out by others to discuss personal problems is significant. Those who others seek to discuss personal problems often or very often, perform much higher in the cognitive domain than those who are seldom asked for assistance. This is another instance of where cognitive performance, not necessarily academic performance, helps the team.



- 17) Which of the following is most like you when you encounter difficulties?
- 1) I avoid difficulties.
 - 2) I seek help immediately when I have a problem.
 - 3) I try on my own for awhile before I seek help.
 - 4) I work really hard before seeking help.
 - 5) I don't seek help; I will die trying.

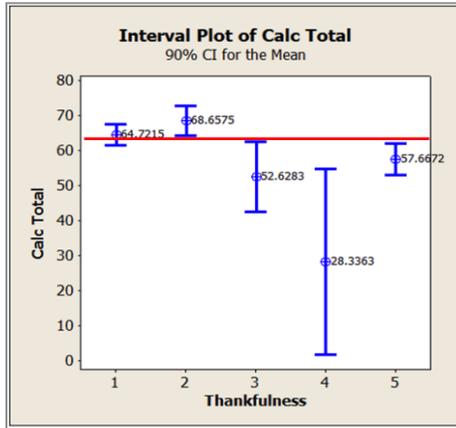
Figure 10. Self-Reliance as an indicator of Total Performance.



- 28) How often do people approach you to discuss their personal problems?
- 1) Very often
 - 2) Often
 - 3) Sometimes
 - 4) Seldom
 - 5) Never

Figure 11. Approachability as an indicator of Total Performance.

One of the questions asked of Soldiers is if they “feel pretty thankful for the people and things in their life.” Those who replied that they “often” feel this way display significantly higher WholeSoldier scores than those who replied “sometimes”, “seldom,” or “never.” This result may be linked to a generally positive attitude toward others.

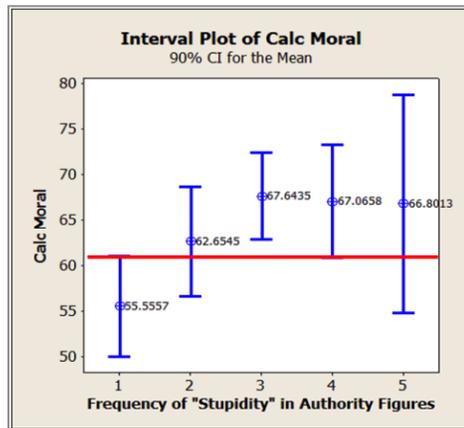


44) I feel pretty thankful for the people and things in my life.

- 1) Very often
- 2) **Often**
- 3) **Sometimes**
- 4) **Seldom**
- 5) **Never**

Figure 12. Thankfulness as an indicator of Total Performance.

When asked how often their teachers or bosses told them to do something stupid, there was a difference between those who replied “very often” and those who answered “sometimes” or “seldom” in the moral domain. Attitude towards (or respect for) authority is an attitude that we want in our Soldiers, since the military is hierarchical in nature.



46) How often do your teachers/bosses tell you to do something stupid?

- 1) **Very often**
- 2) Often
- 3) **Sometimes**
- 4) **Seldom**
- 5) Never

Figure 13. Attitude Towards Authority as an indicator of Moral Performance.

Besides avoiding problems with showing up to the First Sergeant’s formation late, tardiness in Solders is a factor that is not desirable for other reasons. When asked about how often they show up late to parties and work, those who replied “very often,” “often,” or “seldom” performed noticeably lower in the moral domain than those who answered “never.” The trend that we found appears useful in the general linear model. One advantage of this attribute is that it may be an easily observable indicator that predicts performance in the moral domain.

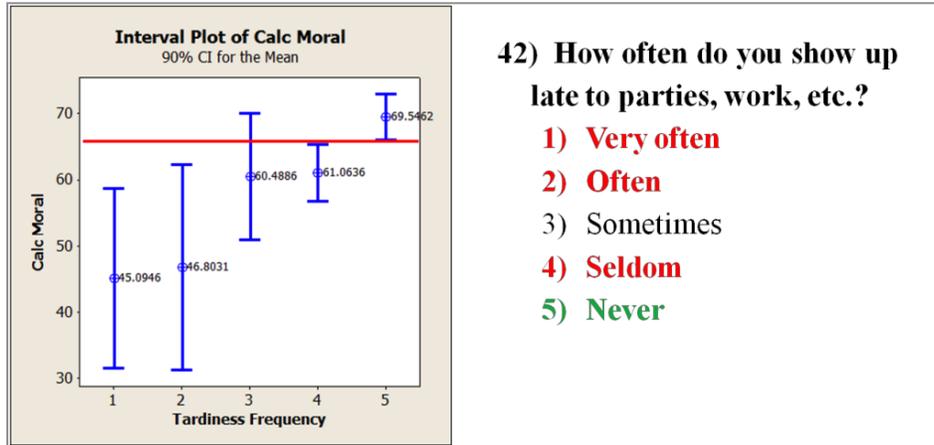


Figure 14. Timeliness/Tardiness as an indicator of Moral Performance.

42) How often do you show up late to parties, work, etc.?

- 1) **Very often**
- 2) **Often**
- 3) Sometimes
- 4) **Seldom**
- 5) **Never**

5. CONCLUSION

5.1. Primary Recommendation

Our primary recommendation is that the Army should routinely assess WholeSoldier performance along a continuum across the entire force; using WholeSoldier performance as an endstate metric opens the door to strategic possibilities that will inform many decisions relating to Soldiers while providing a holistic counseling/mentoring tool. The work thus far received praise from General Dempsey, TRADOC Commander, when he stated that “the Army thirsts for such a mentoring tool that is useful for evaluations” (Dempsey 2009). If we follow this primary recommendation, there are many strategic possibilities to include the recruiting, training, retention, promotion, and assignment of Soldiers.

5.2. Strategic Possibilities / Future Work

In the following sections, we point towards future work that will impact strategic decisions given the implementation WholeSoldier Performance as recommended. This future work is only possible once the Army defines the desired endstate with WholeSoldier Performance or another model.

5.2.1. Recruiting

Using WholeSoldier performance as an endstate metric, we can develop a holistic model of “WholeRecruit Potential” (see Ongoing Efforts). WholeRecruit Potential will be a mathematical model of entry metrics, such as measured attitudes, athletic participation, AFQT scores, etc. When considering various metrics to include in our portfolio of information collected on recruits, we will identify those that best indicate WholeSoldier Performance. As new metrics emerge through research or other means, they would enter the portfolio of metrics only if they better enable us to predict WholeSoldier Performance in a statistical model. In this sense, WholeSoldier Performance and WholeRecruit Potential would be living models that frame recruiting decisions.

With WholeRecruit Potential, the following scenario is possible: a recruit walks into a recruiting station, and after the metrics in our portfolio are gathered on this recruit, the recruit is scored between 0 and 100 (along with confidence intervals or other means to capture uncertainty) to indicate the recruit’s potential for a variety of military occupational specialties (MOSs). We then offer individualized enlistment incentives to this recruit based on current Army needs and the potential of that particular recruit to serve in a variety of MOSs. Given constant needs, the recruit would be offered the most incentives to join in the MOS that he/she displayed the most potential for.

Additionally, recruiters can be better incentivized with WholeRecruit Potential. If a recruiter were given a mission of 280 WholeRecruit points a month, then he/she could accomplish the mission in many ways. For example, the recruiter could bring in 4 recruits with an average of 70 WholeRecruit Points. On the other hand, this recruiter could accomplish the mission by bringing in only 3 recruits with 100, 90, and 90 WholeRecruit points each. In interviews with several recruiters, current mission practice gives the recruiters the wrong incentive to go for the “easy sell” rather than the “stellar recruit” because they are only rewarded for numbers. WholeRecruit Potential allows us to better incentivize recruiting missions in line with our desires for quantity *and* quality.

WholeRecruit Potential would allow the quantification of both the risks present and the opportunities involved in adjusting enlistment policies and standards. During times of recruiting difficulty (i.e. wartime and strong economic conditions), the model could be used to “screen in” recruits believed to be sufficient performers, while during times of recruiting richness, it could be approached from the opposite end to “screen out” those who we do not believe will be high performers. For the purpose of illustration, we would be able to construct charts like Figure 2:

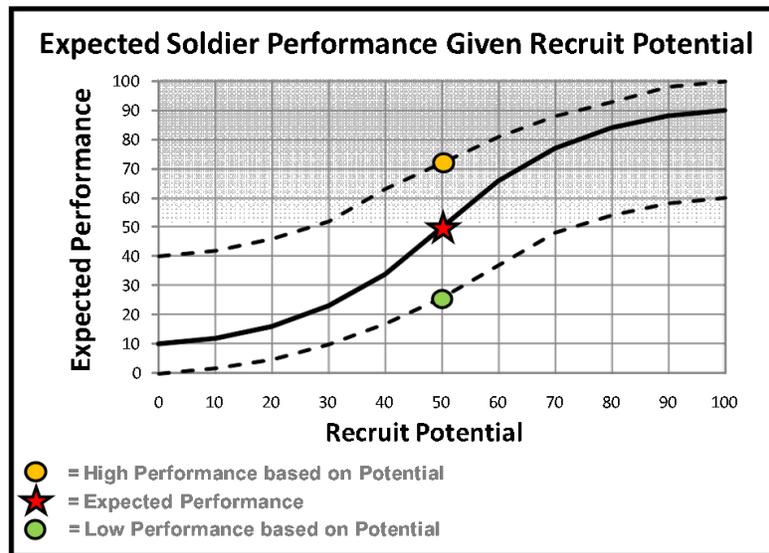


Figure 3. Expected Performance Given Potential

Figure 4 shows how we could probabilistically relate a set level of recruit potential to a range of performance outcomes for a given MOS. By using a mathematical model that relates potential to

performance, we can accurately inform decision-makers concerning the impacts of raising or lowering different standards.

Additionally, with implementation of WholeSoldier performance over time, we could better adjust our target markets and allocation of recruiting resources. One way that we could do this is through geographic analysis based on location or a variety of demographics that can be associated with locations. Such geospatial analysis has become very useful in visualizing the enemy or a variety of factors on a battlefield; it can also be used to see ourselves. Figure 16 is an example of the types of insight that could develop:

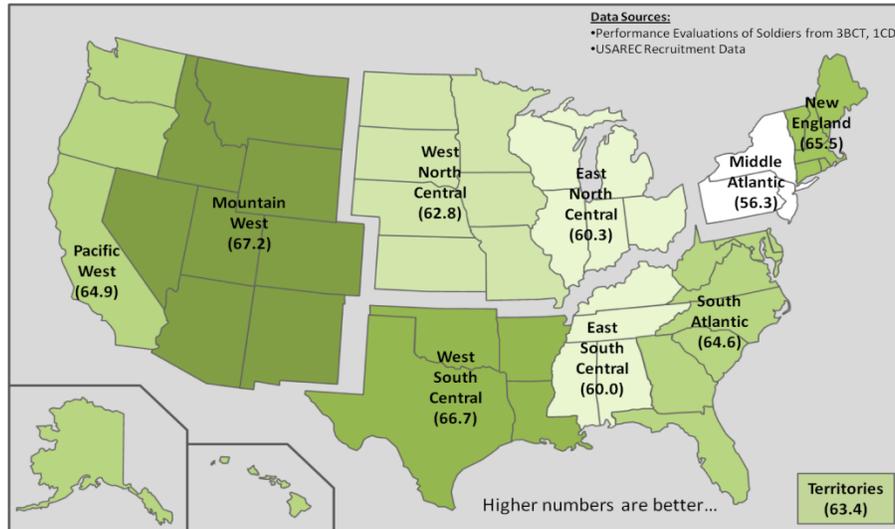


Figure 16. Regional Difference in WholeSoldier Performance.

In Figure 5, we show average WholeSoldier Performance by census region. We must note that there are not any statistically significant differences between census regions in our small scale test (n=195), and that with hundreds of thousands of data points we would expect to see statistically significant differences when viewing data at the state, county, city, or town level. In other words, we would expect geographic or demographic “hot spots” to develop with more data. For instance, if a particular high school routinely provides recruits that eventually display high WholeSoldier Performance, then we could allocate more recruiters to the area. Additionally, such data could be separated into the moral, cognitive, and physical domains to gain a better understanding of the geographic/demographic factors that contribute to strength in different areas. Figure 16 is only meant to illuminate one way that measuring WholeSoldier Performance could help us to refine target markets and the allocation of recruiting efforts.

5.2.2. Training and Assigning

Additionally, WholeSoldier performance implementation could be used for training and assignment in several ways. First, it could be used to determine those who are “best qualified” or “most in need” of individual training and education. It could also be one way to measure the return on investment (ROI) of training and education programs, based on a change in WholeSoldier performance level before and after the period of study. In order to develop

Soldiers multi-dimensionally, we can assign them to breadth-enhancing jobs that would help them develop in areas of weakness or assign them to specialty jobs requiring their current strengths.

5.2.3. Retaining and Promoting

Currently, the Army only offers retention (or re-enlistment) incentives to broad groups of Soldiers who meet certain criteria. In current practice, all Soldiers of a given MOS are offered a flat-rate incentive for re-enlistment. In principle, we might prefer to offer greater re-enlistment bonuses or incentives to Soldiers that have shown that they can perform in line with what we want. There is much ongoing discussion relating to how we retain talented individuals (or high-performers) in the force, and only by measuring what we want in individuals can we make attempts at keeping those that provide the most value and show potential for future performance. WholeSoldier Performance is a value-focused model that defines talent, and allows the development and offering of individual targeted incentives to retain the people we want for the jobs we need.

In the promotion arena, through better understanding of which attributes are desired at the next grade within a particular skill set, WholeSoldier Performance would allow the selection and promotion of the “best qualified” individuals. For instance, if a Soldier displays moral and physical performance, but is lacking in the cognitive domain, then we may desire to delay his/her advancement to non-commissioned officer (NCO). Instead, we may offer training or education that helps this Soldier to develop cognitively to the point where he/she is able to make the sound decisions we expect of NCOs. Over time, when implemented, WholeSoldier Performance will allow us to understand what attributes lend themselves to performance at advanced ranks.

5.3. Ongoing Efforts

5.3.1. Potential to Performance Project

Based on the results of the WholeSoldier work, USAAC has asked the Operations Research Center (ORCEN) at West Point to carry WholeSoldier Performance forward into a broader implementation in the force. Currently, with the advisement of the first author, the ORCEN is implementing WholeSoldier Performance evaluations at the end of cavalry scout One-Station Unit Training (OSUT), which is a sequential combination of Basic Combat Training and Advanced Individual Training. WholeSoldier performance is being used to counsel/mentor Soldiers at the completion of training through the use of an online form. When this form is finalized, the WholeSoldier data is sent to a database where it is linked to all available recruiting data pertaining to the evaluated Soldiers. Using this data, the ORCEN aims to develop a mathematical model of WholeRecruit Potential that includes a recommended portfolio of entry metrics to predict WholeSoldier Performance, thereby informing strategic decisions in the recruiting domain.

5.3.2. WholeOfficer Project

Based on the WholeSoldier work, the Army G-1 is supporting a research team led by the first author to develop a model to measure performance in the officer domain. Based on support from General Dempsey, the team is currently engaged with TRADOC, Army G-1, Human Resources Command, Officer Personnel Management System Task Force, Combined Arms Center, and USAAC with the aim of providing the framework for the current effort to update the Army's Officer Evaluation Report (OER).

5.3.3. WholeCadet Project

Based on the WholeSoldier work, USMA is supporting a research team led by the first author to develop a model to measure performance in the cadet domain. USMA specifies six developmental domains in the Cadet Leader Development System (CLDS). Of the six pillars, USMA measures performance well in the intellectual and physical domains, measures performance marginally in the military domain, and does not measure performance in the social, moral/ethical, and human spirit domains. The goal is to develop relevant measures and then assess in line with the stated development objectives. This work will facilitate decisions about individual cadets and cadet populations, and will be used to inform revisions to the Whole Candidate Score (WCS) that USMA has used for decades to measure the potential of applicants. Currently, the first author has been asked to be a member of a Study Advisory Group (SAG) consisting of academy leaders to investigate such revisions to the WCS.

5.4. Acknowledgments

This work has been supported through funding and guidance from USAREC. In addition, USAAC G-2 facilitated access to data on the Soldiers involved in our study and helped to shape our efforts at strategic communication. Several researchers from ARI were very helpful in the early stages of this effort. Many officers from various academic departments or centers at USMA provided valuable input. COL Rod Sturdivant and COL Andy Glen, Department of Mathematical Sciences, U.S. Military Academy at West Point, provided some initial data analysis thoughts that were very helpful. We thank COL Gary Volesky and CSM James Pippin of 3rd Brigade, 1st Cavalry Division for facilitating our initial WholeSoldier data collection effort. Finally, we sincerely thank the all of the many Soldiers, non-commissioned officers, and officers that have been willing to spend countless hours in consultation throughout this effort.

Appendix A. WholeSoldier Performance Draft Developmental Counseling Form

Draft Developmental Counseling Form								
PRINCIPAL PURPOSE:		To assist leaders in conducting and recording counseling data pertaining to subordinates.						
ROUTINE USES:		For subordinate leader development IAW FM22-100. Leaders should use this form as necessary.						
DISCLOSURE:		Disclosure is voluntary.						
PART I- ADMINISTRATIVE DATA								
Name (Last, First, MI) Infantryman #24, WholeSoldier Study			Rank/Grade		Soldier AKO Username		Date of Counseling	
Organization				Name and Title of Counselor				
Part II - Evaluation of Performance								
KEY	1	2	3	4	5	6	7	
	"Always" "Unacceptable" "Separate from Army"	"Most of the Time" "Very Bad" "Problem Soldier"	"Sometimes" "Bad" "Needs some work"	"Neutral" "Just Enough" "Only what is required"	"Sometimes" "Good" "Bit more than standard"	"Most of the time" "Very Good" "Solid Performer"	"Always" "One of the best" "Example for Others"	
Moral Domain	PURPOSE: Selfless Service, Sacrifice, Commitment, Loyalty, Duty							
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
	Not a team player and displays an individualistic attitude. Soldier tends to put personal desires before others and unit mission.			Soldier neutral towards the team.		Committed to performing duties even when sacrifice required. Selfless member of the team with loyalty to mission and unit.		
	Examples/Comments:							
	MOTIVATION: Will to Win, Endurance, Resilience, Heart, Drive, Determination, Work Ethic							
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
	Lacks determination and drive to get the job done. Doesn't respond well to tough conditions or bounce back from setbacks.			Minimum effort required.		Possesses the will to win and puts forth best effort. Won't quit and positively responds to setbacks. Inspires motivation in others.		
	Examples/Comments:							
	INTERACTION: Respect, Empathy, Compassion, Humor							
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Cynical, negative, or inconsiderate towards others. Doesn't exert effort to interact with others and/or is awkward in interaction.			Soldier is just there.		Positive, respectful, outgoing, and humorous. Makes others comfortable to share ideas/issues and adds to team atmosphere.		
	Examples/Comments:							
CONDUCT: Maturity, Discipline, Bearing, Reliability, Coolness								
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Needs constant supervision and has problems leading a balanced life. Disrespectful to chain of command. Loses bearing/coolness.			Acceptable conduct.		Performs well without supervision and within intent. Mature lifestyle and coolness/bearing under stress is example for others.			
Examples/Comments:								
CHARACTER: Honor, Integrity, Justice, Candor, Personal Courage								
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	
Looks for loopholes and lacks integrity to be trusted. Won't take a stand for right or take ownership of mistakes.			Marginal character.		Can be trusted to do and stick up for what is right. Accepts and strives to correct mistakes. Tells whole truth even when painful.			
Examples/Comments:								
SELF-ESTEEM: Self-Efficacy, Self Worth, Confidence								
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Lacks confidence and is unsure of ability to accomplish mission/goals. Won't try new things and thinks of excuses when failure may happen.			Marginal confidence level.		Displays confidence in interactions and execution of tasks. Understands value to team, isn't afraid to fail, and believes he/she is up to the task.			
Examples/Comments:								

KEY	1	2	3	4	5	6	7
	"Always" "Unacceptable" "Separate from Army"	"Most of the Time" "Very Bad" "Problem Soldier"	"Sometimes" "Bad" "Needs some work"	"Neutral" "Just Enough" "Only what is required"	"Sometimes" "Good" "Bit more than standard"	"Most of the time" "Very Good" "Solid Performer"	"Always" "One of the best" "Example for Others"
Cognitive Domain	KNOWLEDGE: Education, Trainability, Capacity, Technical MOS Skills						
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
	Untrainable and has shown an unwillingness to learn. Lacks the technical competence to complete tasks.			Basic grasp of MOS tasks.	Knows his/her task two levels up. Seeks higher learning. Soldier is an intelligent, life-long learner.		
	Examples/Comments:						
	JUDGEMENT: Visualization, Analysis/Insight, Conceptualization, Filtering						
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soldier displays a lack of good judgment. Soldier does not apply "common sense." Soldier makes choices that hurt the team.			Marginal Judgment.	Soldier makes good decisions. Soldier sees the big picture and knows what is important. Soldier has insight.			
Examples/Comments:							
APPLICATION: Ability to Translate Knowledge and Judgement into Action, Multi-Tasking							
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Soldier is continually reliant on others. Soldier can't handle more than one task at a time. Cannot get the job done.			Ability to complete required tasks.	Able to apply knowledge/ judgment to complete complex tasks. Able to perform more than one task at a time to standard.			
Examples/Comments:							
Physical Domain	PHYSICAL FITNESS: Endurance, Stamina, Strength, Flexibility,						
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Soldier does not meet established Army standards. Soldier cannot carry his/her share of the load. Soldier fails APFT.			Meets minimal physical standard.	Soldier carries more than his/her share of the load. Soldier meets and exceeds established Army PT standards.		
	ATHLETICISM: Power, Speed, Coordination, Agility, Balance, Accuracy						
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Soldier is awkward/unathletic on tasks requiring coordination. Soldier cannot fight. Soldier is unable to perform under load.			Soldier has average athletic ability.	Soldier is an athlete and can apply power, agility, speed, coordination, and accuracy simultaneously in mission situations.		
MEDICAL FITNESS: Illness Frequency, Physical Wellness, Body Composition							
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soldier is regularly on profile or at sick call. Fails to meet body % standard. Unhealthy habits contribute to poor performance.			Maintains average medical health.	Soldier is not hindered by sickness/injury. Takes care of his/her body to prevent illness. Thrives under hard training.			
Examples/Comments:							
		Part III: Plan of Action					
Soldier Signature _____							Date _____
Counselor Signature _____		Date _____					

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LIST OF ACRONYMS

AFQT	Armed Forces Qualification Test
ARCIC	Army Capabilities Integration Center
ARI	Army Research Institute
AVF	All-Volunteer Force
CLDS	Cadet Leader Development System
FBI	Federal Bureau of Investigation
FM	Field Manual
HQDA	Headquarters, Department of the Army
MOS	Military Occupational Specialty
NCO	Non-Commissioned Officer
OER	Officer Evaluation Report
ORCEN	Operations Research Center
OSUT	One-Station Unit Training
SAG	Study Advisory Group
TRADOC	Training and Doctrine Command
USAAC	United States Army Accessions Command
USAREC	United States Army Recruiting Command
USMA	United States Military Academy
USAIS	United States Army Infantry School
WCS	Whole Candidate Score