

## **Combining Predictive Analytics and Field Experiments: Lessons for Veteran Unemployment and Public Management**

**Abstract.** We leverage predictive analytics and a randomized controlled trial to provide rigorous evidence on the effects of job training and job search assistance for servicemembers separating from the U.S. Army and transitioning to civilian employment. Contrary to policy-maker expectations, we find that reducing course requirements (from ten to five) for individuals in a lower-risk category increases their probability of applying for unemployment compensation for ex-servicemembers by 3 percentage points (30%) and increases the average unemployment benefit duration by 0.44 weeks (54%). Reducing the requirements for individuals in a medium risk category (from ten to eight courses) has no statistically significant effect on either outcome. At the micro level, our study provides evidence on the importance of firm-level off-boarding programs, with implications for talent management programs as well as expected unemployment costs. At the macro level, we demonstrate the value of data-driven decision-making and evidence-based policy-making for significant issues such as unemployment and national security.<sup>1</sup>

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## **I. Introduction and Motivation: Leveraging Science for Better Management and Policy**

Recruiting, training, employing, retaining, and transitioning individuals with unique skills and abilities (now popularly referred to as “Talent management”) is an age-old management problem that requires renewed and refocused attention (Collings and Mellahi 2009, Cappelli 2008, Lewis and Heckman 2006). We provide evidence on an important aspect of this critical management problem in a setting that is both unique and uniquely valuable. Specifically, we study the effects of a government provision of tailored career transition services on the employment outcomes for thousands of military Veterans. We do so using a predictive analytic model coupled with a field experiment on unemployment application and duration to help inform future policy decisions.

As a public good that underpins all other parts of the economy, national security warrants special attention from management scholars, economists, and policy-makers. Additionally, the Department of Defense (DOD) is the nation’s largest employer with more than 2.8 million employees (General Services Administration 2019). Annual expenditures are \$700B, constituting approximately one-fifth of federal spending (Department of Defense 2018).

Our setting is uniquely valuable because it provides topical and procedural lessons for managers at multiple levels. At the micro level, we leverage both predictive analytics and a randomized controlled trial (RCT) to provide rigorous evidence on the effects of job training and job search assistance. While predictive analytic models are powerful tools for prediction, they do not test the effectiveness of potential alternative policies. Conversely, while RCTs can generate “gold standard” evidence on the causal effects of new policies, they are typically unable to distinguish which groups require the most attention. In this paper we leverage the strengths of both analytic techniques for improved predictions about optimal policy design (i.e., who to target and how to target them).

We also provide evidence on one of the least studied aspects of talent management: facilitating employee turnover. Firms face a dilemma when developing their internal talent: human capital investments may yield returns for the firm, but they may also enable employee mobility and success elsewhere. As a result, firms may be hesitant to take direct or indirect actions that would enable the career changes of their employees. Given this resistance to creating separation assistance programs (for cost or other reasons), there are scant opportunities for researchers to study off-boarding practices. The U.S. military is a valuable setting to study this issue as it on-boards and off-boards around 200,000 servicemembers each year (Department of Veteran Affairs 2018, Christensen 2017). Such off-boarding is a critical component of military (and perhaps the public sector more generally) lifecycle human resource programs. As a result, our setting allows us to provide new and large-scale evidence on these understudied practices. In addition, given that the United States and most developed countries utilize an all-volunteer military force (Central Intelligence Agency 2019), the success of personnel accessions and transitions is critical to the long-run viability of national security. Promoting Veteran well-being is a strategic goal for the U.S. federal government since future employees of the DOD may judge the organization's commitment to them by observing its contemporaneous treatment of Veterans (Carter 2017). As a result, our study speaks to a management problem of significant public interest.

Our research provides important macro lessons as well. First, the Congressional Budget Office reports that annual expenditures on unemployment compensation for veterans peaked at one billion dollars per year in 2011 with 91,000 individuals receiving benefits in 2010 (Congressional Budget Office (CBO) 2017). Given the size of the transitioning population and the costs of state and federal unemployment assistance to Veterans, facilitating successful employment transitions is an important goal. Second, we document the viability of rigorous social

science techniques (e.g., prescriptive analytics and randomized controlled trials) using administrative data that can serve as an example for public sector organizations at the state and national levels. Such “evidence-based policy-making” (EBP) holds significant promise for improved management in the private (Pfeffer and Sutton 2006), public (Head 2008, Triantafillou 2015), and non-profit (Bogenschneider and Corbett 2010) sectors. Despite this potential, documenting successful implementation of EBP has proven challenging for researchers, managers, and policy-makers (Howlett 2009, Pfeffer and Sutton 2006, Head 2013).

Since 2017, the Army has been conducting a large-scale pilot program (i.e., a randomized controlled trial) of tailored transition assistance to select members of the U.S. Army at several installations worldwide. We provide evidence on the program’s effects for those who separated from the Army by September 1, 2018 (n=7,104).<sup>2</sup> Program managers hypothesized that existing policy and its “one size fits all” nature was inefficient, and that a tailored policy of support services would enable better resource allocation. To evaluate this possibility and better inform DOD policy decisions, the Army designed and implemented a unique pilot program that leveraged predictive analytic and experimental components.

The Army used administrative personnel data from the military and state data on the Unemployment for Ex-Servicemembers (UCX) program to estimate predictive models of individual servicemember unemployment probabilities (following Carter and Miller 2015). We then exploit a large-scale field experiment at locations around the world that randomly assigns individuals with comparable risk levels to different transition program requirements (business as usual control group or a reduced requirement treatment group). We utilize administrative state

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<sup>2</sup> Our analytic sample includes individuals who started their transition program prior to January 1, 2018 and had separated from the Army by September 1, 2018. We use unemployment data as of March 31, 2019. We describe the sample in more detail in Section IV.

and federal data on UCX applications and usage to evaluate the labor market effects of these reduced requirements.

Contrary to expectations throughout the organization (e.g., from policy-makers and managers), we find that reducing course requirements (from ten to five) for individuals in the low-risk category increases their probability of applying for unemployment compensation for ex-servicemembers by 3 percentage points (30%) and increases the average unemployment duration by 0.44 weeks (54%).<sup>3</sup> Reducing the requirements for individuals in the medium risk category (from ten to eight) has no statistically significant effect on either outcome, but our estimates do not enable us to rule out meaningful changes in either direction to these outcomes.

We document which requirements seem most impactful and briefly discuss additional potential research and policy options, including how more intensive services might complement the status quo. At the micro level, our study provides rigorous evidence on the importance of firm-level off-boarding programs, with implications for talent management as well as expected unemployment costs. At the macro level, we demonstrate the value of data-driven decision-making and evidence-based policy-making for significant issues such as unemployment and national security.

We proceed as follows. In Section II, we review the related literatures in management, economics, and public policy. In Section III, we describe the institutional setting. Section IV documents our experimental design and Section V describes our data. We provide our results in Section VI and conclude in Section VII.

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<sup>3</sup> The courses that the lower risk group was not required to complete but the medium risk group were required to take were: the Gap Analysis/MOS Crosswalk, Individual Assessment Tool, and Continuum of Military Service courses

## **II. Literature Review: Contributions to Management, Economics, and Public Policy**

Our research contributes to three literatures across management, economics, and public policy.

We briefly review each below with an emphasis on our contributions.

### *II.A. Research on Talent Management and Employee Departures*

The talent management literature (sometimes referred to as human resource management or human capital management) is large and growing, and we do not propose to review it all here.<sup>4</sup> We focus instead on one potentially important but understudied topic: dealing with employees who are leaving the firm. Research on employee transitions is virtually nonexistent, even in studies discussing core human resource functions (e.g., hiring, retention). Yet employee departures may have important consequences for firms, whether the departures are voluntary or not. Involuntary departures, such as firing or layoffs, have legal and reputational consequences that could affect the firm's value. These departures also have direct financial consequences for firms by affecting the Unemployment Insurance contribution rate that they pay (e.g. New York rates varied from 0.6% to 7.9% in 2019). Voluntary departures could also affect the firm's reputation. In equilibrium, strategic firms should balance the expected returns on any/all investments in the employee with the expected reputational costs for current and prospective employees about working with the firm.<sup>5</sup> These concerns may appear small relative to other talent management initiatives, such as

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<sup>4</sup> For helpful reviews, see Sparrow and Makram (2015), Vaiman, Scullion and Collings (2012), Collings and Mellahi (2009), and Lewis and Heckman (2006).

<sup>5</sup> We are not the first to identify the importance of successfully off-boarding employees. Cappelli (2008) and Schweer et al. (2012) note the potential value in employers staying in contact with its former employees in the event they wish to change firms again, though they do not study any specific practices. If a firm depends importantly on employee referrals, then off-boarding could be even more important

recruiting or retention, but the relative dearth of research seems surprising given today's gig economy, increased employee mobility, and the ability for small employee problems to "go viral."

In the military organizations we study, this off-boarding is uniquely and independently important. Prior research documents the importance of referrals in military recruiting (Buttrey, Whitaker and Alt 2018, Liebert and Golby 2017, Jeremy 2012), which seems unsurprising since military service is a relatively rare career choice and a unique one given the occupations and experiences. Existing economic research suggests that potential recruits are sensitive to U.S. war casualties (Christensen 2017), and government policies towards the military and Veterans will affect past, current, and future military members (Carter 2017).<sup>6</sup> The former Army Chief of Staff Dennis J. Reimer once remarked, "Soldiers are our credentials" and we suspect that this holds for the government's treatment of Veterans more widely (Reimer 2003).

## *II.B. Labor Market Assistance Programs*

We also provide new evidence in a large literature examining the effects of job assistance programs.<sup>7</sup> Card, Kluve, and Weber (2017) review 207 studies on labor market programs across the world that provided training, job search assistance, private subsidies, and public employment. Their analysis suggests that while the short-run effects of these programs are small (close to zero), they have positive effects in future years. Additionally, programs that include training have the largest impacts. Manoli et al (2018) provide a careful and current review of research on state-level

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<sup>6</sup> George Washington once remarked, "The willingness with which our young people are likely to serve in any war, no matter how justified, shall be directly proportional to how they perceive veterans of earlier wars were treated and appreciated by our nation."

<sup>7</sup> Although less related to our study, other research evaluates the effects of job search requirements and bonuses on employment outcomes. Bolhaar, Ketel, and van der Klaauw (2019) find that randomly assigned job search requirements for welfare applicants in Amsterdam increased employment and reduced welfare use. Meyer (1995) analyzes state level policies that randomly assign unemployment insurance (UI) recipients to receive bonuses for finding jobs sooner. He finds that bonuses decreased UI usage and did not reduce earnings in the long run.

job assistance programs in the U.S. Results generally show that services, including eligibility review and job counseling, reduce unemployment insurance (UI) duration and benefits, and increase individual earnings. Michaelides and Muser (2017), Michaelides and Muser (2018), and Manoli et al (2018) analyze an experimental program in Nevada during the recent Great Recession. The eligibility review and personalized job-counseling services reduced UI usage in the short run and up to five years after the treatment.<sup>8</sup>

Decker et al (2000) conduct a study most similar to ours. The Department of Labor randomly assigned people receiving UI to one of four groups: a control group, a group that received “orientation, testing, a job search workshop, and a one-on-one assessment interview,” a group that received an individual assessment plan, and a final group that received an individual assessment plan and were guided toward specific training programs. For all treatment groups, they found modest reductions in UI usage (e.g., approximately 1/2 a week).<sup>9</sup> Their results on earnings were mixed: in one location (Washington, D.C.), they found some increased benefits for all three treatment groups; in their other location (Florida), they found no statistically significant effects on earnings. While Decker et al (2000) examine services offered to those already on UI, we study assistance given to individuals *prior* to separating from employment or receiving benefits. Both policies are important, but our approach seems potentially more valuable to firms interested in better off-boarding programs and governments interested in pro-active approaches.

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<sup>8</sup> Another long-standing concern with unemployment insurance is that individuals may take benefits despite having the capability to work. Black et al (2003) document this moral hazard using random assignment of job assistance benefits. While benefit receipt reduced UI usage and had no long-run negative impacts on earnings, some individuals simply dropped out of UI rather than taking the assistance, which signaled their ability to find employment despite being on UI.

<sup>9</sup> In one location (Washington, D.C.) they found greater effects on reduction in UI benefits for the group receiving “orientation, testing, a job search workshop, and a one-on-one assessment interview,” but in their other location (Florida) results for the three treatments were similar.



Together, the existing literature suggests that job assistance programs can modestly reduce unemployment insurance usage with no negative effects on long-run employment. Relative to this existing unemployment literature, we provide three primary contributions. First, we combine predictive analytic models of individual unemployment probabilities with randomly assigned job transition services tailored to their unemployment risk. Second, to our knowledge, we are the first rigorous analysis of the effects of job transition services for the large population of transitioning members of the U.S. military. Third, we provide evidence on programs and benefits provided prior to unemployment benefit receipt, while existing studies focus on services offered to individuals already on unemployment.

### *II.C. Research on Evidence-Based Decision-Making*

Leveraging research and science for managerial decisions has grown in popularity and ambition over the past several decades, due in part to the proliferation of analytic tools and techniques (e.g., Walker 1982, Montibeller 2018) as well as access to more and better data (e.g., Qian and Xie 2015, this journal). Many now refer to these efforts as “data driven decision-making” or “evidence-based policy-making” (EBP).<sup>10</sup> In public management and public policy, there is a burgeoning EBP literature with applications to education, criminology, social work and the environment (Hammersley 2005, Cairney 2016, Oliver et al. 2014). Pursuing evidence-based policy-making is now a commonly stated goal among managers in government (Triantafillou 2015, Head 2013) and other sectors (Bogenschneider and Corbett 2010, Pfeffer and Sutton 2006), as well as among academic researchers (Oliver et al. 2014).

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<sup>10</sup> Evidence based policy-making is also referred to as “what works,” “performance management,” the “problem solving” model of policy-making, “instrumental rationality,” and “technical rationality” (Bacchi 2000; Elliott and Popay 2000; Lindblom 1959).

There is strong intuition that science can inform policy (Choi et al. 2005), and given contemporary fiscal environments and pressing social problems, there is persistent interest in EBP to deliver performance and value (Parkhurst 2017, Triantafillou 2015, Liebman 2013, Bogenschneider and Corbett 2010, Head 2008). Despite these positive views though, EBP continues to face many challenges (Howlett 2009, Solesbury 2001) and there are few documented successes. Pfeffer and Sutton (2005) cite Hippocrates' reflections on these challenges for management and organizational scholars, "Life is short, the art long, opportunity fleeting, experiment treacherous, judgment difficult."

We contribute to this large and diverse literature in two ways. First, we demonstrate the capability of large organizations, including those in the public sector, to design and conduct prospective evidence-based policy-making on issues of significant importance: unemployment and the provision of national defense. We do so utilizing both complex predictive analytics to model unemployment probabilities, as well as randomized experimentation and piloting. While these methods are challenging to implement, they generate the potentially most useful insights for policy-makers. Second, in our discussion, we document our linkages to the existing EBP literature on the policy design and execution processes, thereby providing observational evidence on best practices and "what works" in policy development (e.g., pragmatism, using "insiders," defeating stereotypes, and leveraging leading scientific methods like experiments).

### **III. Background: Veteran Unemployment and Government Transition Assistance**

Veteran unemployment has been a source of significant concern for the military services and the federal government for the past 10-15 years. These concerns arise for a number of reasons including the adverse effects of military service on labor market and health outcomes (Sabia and

Skimmyhorn 2018; Cesur et al. 2016, 2013; Lyk-Jensen et al. 2016), the government's commitment to Veterans as part of the all-volunteer force (Executive Order 13822 2018; Carter 2017), and the significant public expenditures on unemployment benefits for former servicemembers (CBO 2017). There are similar concerns from private sector firms (e.g., JP Morgan Chase's "100,000 Jobs Mission" and Walmart's "Careers with a Mission" effort), non-profit organizations (e.g., the Chamber of Commerce's "Veterans Coming Home" initiative and the Call of Duty Endowment), and national research bodies (e.g., the National Academy of Sciences, Engineering and Medicine) as well.

These concerns have generated significant programs and resources devoted to enhancing Veteran employment, including a federal interagency group with participation from the Departments of Defense, Education, Labor, and Veterans Affairs, the Small Business Administration, and the Office of Personnel Management. Congress has passed laws including the Veterans Opportunity to Work to Hire Heroes Act (2011), and Presidents have signed executive orders related to the issue (e.g., Order 13518 by President Obama in 2009 and Order 13822 by President Trump in 2018).

We study these issues in the U.S. Army, one of the nation's largest organizations (i.e., with approximately one million uniformed personnel and more than 250,000 civilian personnel). The Army currently assists soldiers before and after their separation. By law, transitioning soldiers are required to complete the Transition Assistance Program (TAP).<sup>11</sup> The TAP takes several weeks to complete, with soldiers completing courses based on their own availability (they continue to work while transitioning) and course availability at their installation. While individuals should

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<sup>11</sup> Congress established the TAP in the National Defense Authorization Act of 1991. For more details, see: <https://fas.org/sgp/crs/natsec/IF10347.pdf>

begin their TAP approximately one year prior to their separation date, many delay and complete it in less time.

Completion of the TAP equates with an individual achieving career readiness standards (CRS). CRS certification is significant and requires approximately eleven courses/events:

1. Veterans Administration (VA) benefits briefing
2. Department of Labor employment workshop
3. Electronic VA Benefits registration
4. An individual transition plan
5. Completion of a military occupational specialty (MOS) Crosswalk/Gap analysis (i.e., guidance on translating military skills and training into civilian careers, identifying gaps between current skills and desired career)
6. Completion of an Individual Assessment Tool (e.g., a standardized assessment tool such as Department of Labor O\*Net Interest Profiler, Meyers-Briggs Type Indicator)
7. Certification/Licensure requirement (i.e., identifying and documenting any/all requirements for desired licenses or certifications in support of a specific occupation)
8. Attendance of the Continuum of Service course (i.e., learning about service in the National Guard or Reserves)
9. Creation of a 12 Month Post-Transition Budget
10. Generating a Job Application Package (or providing documentation of a job offer letter).
11. A capstone event

Soldiers can complete the courses in different orders, though many installations sequence them as part of regularly scheduled transition workshops. Our study evaluates the role of select groupings of these courses/events, which we describe in more detail below.

The military provides assistance to servicemembers after their separation as well. One salient form of assistance are the Montgomery and Post 9/11 GI Bills, which provide education benefits to Veterans.<sup>12</sup> We focus instead on a lesser-known benefit related to employment. Under the Unemployment for Ex-Servicemembers (UCX) Program and the Emergency Unemployment Compensation Act of 1991, most military members are eligible to receive unemployment insurance benefits upon separation from the military.<sup>13</sup> UCX is a federal program administered by states that is designed to facilitate veteran transitions into the civilian labor market. Benefit levels vary by state. For example, in North Carolina an individual would receive one-half of their previous week's pay for a max of 20 weeks and in Washington state the amount would be the same but the duration could be up to 26 weeks.<sup>14</sup> A typical servicemember (pay grade E4) separating from the military with four years of service (basic pay of \$2,555 per month) would, if deemed eligible, receive about \$300 per week.

UCX and traditional UI programs are similar in many respects. States determine the amount and duration of benefits, as well as any special requirements for benefit receipt. Recent employers pay UI benefits through taxes. The Army reimburses states for their UCX payments. Individuals apply for UCX benefits in the state where they reside, and the state submits a request to the appropriate federal agency (in our case, the U.S. Army Human Resource Command) for an eligibility determination. One notable difference between UCX and UI is that a servicemember is

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<sup>12</sup> See Bound and Turner (2002) and Angrist (1993) for evidence on the GI Bill after World War II and Vietnam, and Barr (2015) and Martorell and Bergman (2013) for evidence on the GI Bill in more recent wars.

<sup>13</sup> The current law is actually a successor to the original GI Bill, which provided combat veterans compensation as they looked for work. The current law is the result of six adjustments over a 45-year period by Congress. Servicemembers are eligible for UCX benefits if they complete their service requirement and leave under honorable conditions; if they separated for medical conditions or family needs, even if they leave prior to the end of their contract; if they leave prior to the end of their contract for the convenience of the military; if they are NOT receiving Post-9/11 Education Assistance (a condition added in fiscal year 2016).

<https://www.congress.gov/114/plaws/publ92/PLAW-114publ92.pdf>

<sup>14</sup> <https://www.nolo.com/legal-encyclopedia/collecting-unemployment-benefits-north-carolina.html>;  
<https://www.nolo.com/legal-encyclopedia/collecting-unemployment-benefits-washington.html>

eligible for UCX even when voluntarily leaving the military. In 2013, almost half of all soldiers separating from the Army applied for UCX (Desrosiers et al 2014, Carter and Miller 2015, CBO 2017), but applications rates have since declined. CBO reports a decrease from 91,000 to 34,000 during 2010 to 2016 (CBO 2017). This decrease in UCX corresponds to decreases in Veteran unemployment rates.<sup>15</sup>

In addition to the reputational and human resource management aspects of facilitating transitions (discussed above), there are straightforward financial reasons for firms to want their former employees to find work. Namely, they are responsible for paying the unemployment benefits. Aggregate UCX expenditures for the Department of Defense have also followed U.S. macroeconomic trends (CBO 2017), growing during the Great Recession (to approximately \$1B in both 2010 and 2011) and declining more recently (to \$311M in 2016). While the Army's size and total unemployment bill may exceed that of nearly all private firms individually, the financial benefits to facilitating successful transitions for former employees can also be substantial in the private sector.

#### **IV. Experimental Design: Evaluating the Effects of Transition Program Requirements on Veteran Unemployment**

##### *IV.A. Predicting Unemployment Applications*

Previous research (Carter and Miller 2015) uses administrative data to provide descriptive evidence on individual characteristics that correlate with Veteran applications for UCX for those soldiers separating between 2011 and 2013. During this time, approximately half of soldiers who

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<sup>15</sup> Other potential explanations for this reduction are improved transition serviced from the Department of Defense and military Services, a more stable force size with fewer separations, and changes in federal law that now prohibit individuals from receiving UCX while also using their GI Bill benefits.

were eligible for UCX were applying for it, and the Army was interested in learning more about those most at risk. The previous research estimated models of the following form:

$$y_{ilt} = \alpha + \gamma X_i + \theta_t + \epsilon_{ilt}, \quad (1)$$

In these linear probability models,  $y_{ilt}$  was an indicator for UCX application by soldier  $i$  transitioning from military base  $l$  in month  $t$ .  $X_i$  is a vector of individual soldier characteristics, including gender, race/ethnicity, marital status, dependent children, Armed Forces Qualification Test (AFQT) category, education level, military grade/rank, occupational branch, years of service, military occupational specialty, home-of-record state, and Army separation code.  $\theta_t$  represented year fixed effects. Using multivariate ordinary least squares regression, the authors documented that individuals with the following characteristics were more likely to apply for UCX: females, minorities, those with lower education, those with lower cognitive ability (AFQT categories), those with disability ratings, those in service and support occupations, and those separating without successful completion of their service contract (e.g., separation for a negative reason with an honorable discharge).

#### *IV.B. Pursuing Transition Program Improvements*

The Army's executive agent for transition services, the Solider for Life - Transition Assistance Program (SFL-TAP) has long recognized that the TAP is largely a "one-size-fits-all" program designed to meet legal mandates from Congress.<sup>16</sup> Congress and the DOD did not design the TAP to meet the unique transition needs of individuals with significant differences in their educational attainment, labor market experience, vocational skills, and other characteristics.<sup>17</sup> While transition

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<sup>16</sup> Based on author conversations with leaders and administrators in the U.S. Army Human Resources Command and transition counselors at installations nationwide.

<sup>17</sup> The TAP does allow individuals to attend different optional tracks (e.g., a technical track, a higher education track, or an entrepreneurship track).

counselors may endeavor to assist each servicemember, the large volume of participants and their widely varied experiences and goals serve to minimize the personalized nature of the TAP.

Program leaders in the Army's SFL-TAP office sought to improve the TAP for all transitioning servicemembers, and in 2015, they approached one of the Army's principle analytic organizations, the Office of Economic and Manpower Analysis (OEMA) at West Point for assistance.<sup>18</sup> The initial SFL-TAP motivations for TAP redesign were to provide more intensive and personalized services to those at highest risk of unemployment. However, since the SFL-TAP lacked data on which services to deliver as well as the resources to deliver them, OEMA helped SFL-TAP design a pilot program under an evidence-based policy-making framework. Specifically, OEMA first worked with the SFL-TAP to determine if reducing the TAP requirements for those at lower risk of unemployment could generate resource savings. If so, then SFL-TAP would have a stronger case for reallocating and targeting their resources in the future.

Importantly, while the goal of the pilot was not to reduce Veteran unemployment, it sought to ensure that any potential program changes (i.e., reduced requirements) would not adversely affect transitioning soldiers by increasing their likelihood of unemployment. Therefore, the anticipated (and desired) outcome from policy-makers for requiring fewer courses for low-risk individuals was to find no effects on unemployment outcomes. If the U.S. Army Human Resources Command could document that reducing requirements imposed no costs on these individuals, then they could more confidently recommend reallocation of the resources to those most at risk. Equally important, the pilot design sought to prevent large, program-wide decisions (by the Army or DOD) from taking place before careful design, data collection, and analysis.

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<sup>18</sup> SFL-TAP and OEMA had worked together on previous transition-related projects and had discussed in detail the Carter and Miller (2015) UCX study.



SFL-TAP worked with Army units to field the pilot program at installations around the world. The pilot selected locations that were both large (to generate large samples relatively quickly) and representative of the full population of transitioning Army servicemembers. The pilot began in November 2016 at six military bases (i.e., Fort Bragg near Fayetteville, North Carolina; Fort Campbell near Clarksville, Tennessee, Fort Drum near Watertown, New York; Fort Hood near Killeen, Texas; Joint Base Lewis-McChord near Tacoma Washington; and U.S. Army Garrison Bavaria near Grafenwoehr, Germany) with a focus on enlisted soldiers.<sup>19</sup> The sample for this analysis includes soldiers who started the TAP at one of these bases prior to January 1, 2018 and who separated from the Army by September 1, 2018.<sup>20</sup>

The critical components of the pilot program were a predictive analytic model of individual unemployment probabilities and random assignment of individuals to different transition program requirements. This unique combination of scientific techniques leveraged both predictive modeling as well as a randomized field experiment. OEMA first used the study of Carter and Miller (2015) as a springboard to create a more robust and reliable model for predicting unemployment probabilities and then, based on stakeholder input, assigning individuals to low, medium, and high risk categories. Following the notation of equation 1 above, they first estimated logistic regression models of the following form:

$$y_{il} = \frac{e^{\gamma X_{il}}}{1 + e^{\gamma X_{il}}} \quad (2)$$

The risk model includes individual characteristics: cognitive ability (as measured by the AFQT score), as well as indicator variables for gender, race/ethnicity, dependent children, marital status,

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<sup>19</sup> The RCT applied only to enlisted soldiers who were not entering retirement or leaving Warrior Transition Units.

<sup>20</sup> These dates ensure we maximize our sample size while also ensuring that individuals have sufficient time to complete the TAP and transition, which can take up to 12 months.

education level, military rank at separation, military occupation specialty, Army separation categories, state home of record, and current military location.<sup>21</sup> Relative to the original linear probability models of Carter and Miller (2015), the revised logit model has the advantages of better accounting for a wide range of probabilities as well as ensuring that post-estimation predictions yield values from zero to one. OEMA assigned individuals in the pilot program to one of three unemployment risk categories (i.e., High, Medium, and Low) based on their estimated probability.

The pilot's objective was to test the impact of the reduced course requirements on soldiers' transitions into the civilian labor force, with the expectation and hope that reducing requirements would not adversely affect any transitioning soldiers (i.e., not increase unemployment outcomes). In the second phase of the pilot program, OEMA randomly assigned soldiers at the individual level within the same risk category to different transition requirements. Our sample includes a total of 17,395 transitioning soldiers (3,146 low risk, 3,913 medium risk, and 10,213 high risk).

In practice, when soldiers enrolled in the transition program at their local transition office, counselors registered them for the pilot using a website that first generated their risk score (and corresponding category) and then assigned them to a control (status quo) or treatment (reduced requirements) group.<sup>22</sup> Individuals were not privy to their risk score (or category), or any information about the pilot program. Transition counselors provided each soldier with a personalized checklist that outlined their specific TAP requirements. Importantly, the pilot did not

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<sup>21</sup> The logit model excludes controls for time periods since we will be using estimates from the model to predict individual risks in future time periods. The sample period was from 2010 to 2013.

<sup>22</sup> The pilot program actually included two treatment groups: a reduced requirement group (at Hood, Lewis-McChord, and Bavaria) and a reduced requirement group with the opportunity for individual unit commanders to upgrade or downgrade individual risk categories and corresponding transition requirements (at Bragg, Campbell, Drum). Commanders changed the recommended risk level in less than 5% of the cases and so we omit analyzing this treatment group separately. Instead, we pool all bases in our analysis and analyze the combined treatments. For the low risk soldiers, reassignment would tend to bias our effect estimate toward zero since the commander could only increase their risk level (from Low to Medium).

deprived soldiers of any course opportunities. The checklists identified non-required courses as optional, and soldiers could complete them at their discretion.

In Table 1, we list the course requirements for each risk category by experimental group. All soldiers in the control group (columns 1 and 3), regardless of their risk category, received a checklist with ten required courses. These requirements constitute the career readiness standards (CRS) for the Army's Transition Assistance Program (TAP) under the status quo. Similarly, High-risk soldiers in the control and treatment groups received the same checklist of ten required courses.<sup>23</sup> As a result, we exclude this group from our subsequent analyses.

Medium risk soldiers (right panel) assigned to the treatment group (column 4) received a checklist with eight required and two optional courses (creating a 12 Month Post-Transition Budget and generating a Job Application Package).<sup>24</sup> Thus, our experimental estimates for this group reflect the combined effects of not having to complete these two items.

Low risk soldiers (left panel) assigned to the treatment group (column 2) received a checklist with only five required courses. For this group, five requirements were eliminated (i.e., creating a 12 Month Post-Transition Budget, generating a Job Application Package, completing the Individual Assessment Tool, completing a MOS Crosswalk/Gap analysis, Certification/Licensure, and attending the Continuum of Service). The experimental estimates for this group reflect the combined effects of not having to complete these five items.

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<sup>23</sup> While the high-risk group is large and there were potential advantages to varying the requirements for this group, Army transition program leaders opted to maintain the maximum requirements for this group to ensure they were receiving all services available under the status quo.

<sup>24</sup> We count the Individual Assessment Tool (IAT) as required for the medium risk soldiers in the treatment group despite it being listed as optional on the checklist for these soldiers. In practice, the IAT was taught during the same class session as the Gap Analysis/MOS Crosswalk course, which was still required. Our data suggest that medium risk individuals in the treatment and control groups completed the IAT at the same rates (see Table 3).

As mentioned above, the unique combination of both predictive analytics and experimental treatments are both rare and uniquely valuable. Policy-makers and researchers often pursue one or the other method, but rarely have the data, analytic capabilities, and policy influence to pursue both. In this research, we leverage the strengths of both analytic techniques for improved predictions about who to target and how to target them.

## **V. Data: Leveraging Administrative Data from State and Federal Governments**

We leverage administrative data from the Total Army Personnel Database on enlisted soldiers who separated from the Army in 2017 and 2018. The data contains demographic characteristics related to employment outcomes including age, gender, race, marital status, number of dependents, education, and AFQT scores (a measure of human capital used by the Army to determine enlistment and job eligibility).<sup>25</sup>

We combine this personnel data with program data from the pilot program. Specifically, we observe each individual's risk score, his/her risk category, and a record of all TAP classes/items completed as part of his/her transition program.

We observe two labor market outcomes. For all 50 states, we observe individual applications for Unemployment Compensation by Ex-Servicemembers (UCX). States send individual applications to the U.S. Army for eligibility determinations. For 35 states, we also observe more detailed UCX billing data, including UCX duration and total receipt.<sup>26</sup> Our analysis will thus examine UCX applications and UCX usage. As a reminder, UCX differs from UI in that a soldier is eligible for UCX regardless even if they separate from the military voluntarily. Rules for eligibility (such as earnings level and job search requirements) are largely the same. The federal

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<sup>25</sup> See Griliches and Mason 1972

<sup>26</sup> These states participate in the Military-State Data Exchange System, an automated system for UCX claims.

government establishes eligibility and funds UCX benefits. Meanwhile, the state where the service member applies for these benefits determines the duration of benefits and the amount of benefits.<sup>27</sup>

## VI. Results: Experimental Evidence on Tailored Career Transition Assistance

To ensure that the pilot program had its intended effect of reducing individual's transition course completions, we first estimate the effect of reducing course requirements on actual course attendance. Then we estimate the effect of reduced requirements on post-service application for and take-up of UCX benefits. Our random assignment enables us to compare the outcomes of soldiers assigned to the treatment group (reduced requirements) with those of the control group (full requirements). We make these comparisons between soldiers in the same risk category (i.e., low or medium risk) who enter the transition program at the same location (i.e., Army base) in the same month, while also controlling for other individual characteristics. Specifically, we estimate the following preferred specification separately for low and medium risk soldiers,

$$y_{ilt} = \alpha + \beta T_i + \gamma X_i + \theta_{lt} + \epsilon_{ilt} \quad (3)$$

where  $y_{ilt}$  is the outcome (e.g., an indicator for UCX application) for soldier  $i$  entering the transition program in location  $l$  in month  $t$ .  $T_i$  is an indicator that is equal to one if individual  $i$  is assigned to the treatment group (reduced course requirements).  $X_i$  is a vector of soldier characteristics, similar to those used in equations 1 and 2 above. Here we include: a quadratic in years of service, and indicator variables for gender, race/ethnicity, dependent children, marital status, education level, AFQT score category, rank at separation, military occupation specialty, Army separation categories, state home of record.  $\theta_{lt}$  represents location by month fixed effects.

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<sup>27</sup> Departing servicemembers are eligible to obtain UCX benefits in any state they choose to reside.

### *VI.A. Evidence on Experimental Validity*

We are interested in the coefficient estimate for  $\beta$ , which reflects the causal effect of a reduction in course requirements. Our empirical strategy relies on the assumption that the program randomly assigned soldiers to the treatment or control group within a given location in a given month. We demonstrate random assignment in Table 2. The summary statistics in Panel A suggest that treatment and control groups for each risk category are very similar, with few observed differences that are small in magnitude. We formally test whether the assigned treatment is related to these individual characteristics in Panel B. Specifically, we estimate a version of equation 3 by regressing an indicator for treatment on our soldier characteristics and assignment month by location fixed effects and then test these characteristics for joint significance. We find p-values for the soldiers characteristics of 0.60 and 0.22 for the low and medium risk groups, respectively, suggesting that individual characteristics are unrelated to treatment (i.e., they are randomly assigned). We also document that the baseline soldier characteristics explain almost none of the variation in treatment status beyond the month by location fixed effects. The partial R-squared values for soldier characteristics are 0.003 and 0.004 for the low and medium groups respectively. We therefore proceed with the assumption of valid random assignment.

### *VI.B. Program Effects on Course Completions*

We next investigate the effect of reduced course requirements on individual course-taking behavior for low and medium risk soldiers, and provide our results in Table 3.<sup>28</sup> Each cell in Table 3 contains OLS estimates of  $\beta$  in Equation 3 (the difference between treatment and control groups), where the dependent variable is an indicator for whether a soldier took a given course, controlling for soldier characteristics and month by location fixed effects. We estimate heteroskedasticity

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<sup>28</sup> These estimates are comparable to the first stage in an instrumental variable (i.e., two stage least squares) method.

robust standard errors (in parentheses) and provide the control group means (in italics). The Panel A results show that the completion rates for the courses that are always required are statistically indistinguishable, as we would expect. Completion rates vary from 91-98 percent. The Panel B results suggest that when courses are made optional for low risk soldiers in the treatment group, the soldiers complete them at much lower rates that are statistically significant ( $p < 0.01$ ). Reductions vary from 23 percentage points (pp) for the continuum of military service class (on a control mean of 83 percent) to 39 pp for the Gap Analysis / MOS Crosswalk (on a mean of 86 percent).<sup>29</sup> There is no difference in course completion by treatment status for medium risk soldiers (column 2 of Panel B), as expected since these classes were still required for this group. The Panel C results show that courses that are optional for both low and medium risk soldiers in the treatment group see statistically significant drops in completion rates for both groups (38-48 pp less than the control group rates of 81-86 percent). Taken together, these results show that reducing course requirements substantially reduces course completions.

#### *VI.C. Program Effects on Applications for Unemployment*

In Table 4 we provide estimates of the impact of reduced course requirements on post-service unemployment benefit applications. We provide OLS estimates of  $\beta$  in equation 3 where the dependent variable is an indicator for whether a soldier applied for UCX after leaving the Army. For soldiers in the low-risk category (left panel), across all specifications, the results show that reduced course requirements increased UCX applications by approximately 3 pp. The

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<sup>29</sup> The Continuum of Service course results are noteworthy. The course is designed to inform (and enroll) transitioning service members in the Army Reserves or Army National Guard. In Appendix Table A1 we show that the reduced course requirements for the low risk group decrease accessions to these two components by 2.2 pp (relative to a control group mean of 14.6%), though the results are only marginally statistically significant ( $p < 0.10$ ). These reductions in continued military service do not explain our main unemployment application findings. In Appendix Table A2 we show that our main results (Table 3) are unaffected even when we omit individuals who subsequently join the Reserves or National Guard.

coefficient stability across models provides additional evidence on valid random assignment. Relative to the control mean of 11.4 percent, the estimated effect is large (25-30%) and statistically significant ( $p < 0.01$ ). Our results strongly suggest that reducing these course requirements for soldiers in the low risk category would adversely affect their post-transition employment.

For medium risk soldiers (right panel), we estimate that reducing course requirements reduced unemployment applications by approximately 1.5 pp. However, these estimates are not statistically significant and their economic magnitude relative to the control mean of 18.4 percent is small (8-9%). Given that the purpose of the pilot program was to identify areas of potential resource savings that do not adversely affect soldier outcomes, our estimates enable us to rule out increases in UCX applications by soldiers in the medium risk category of 1.05 pp using our 95% confidence intervals. These courses represent a potential area for reduced transition program requirements for select soldiers and corresponding resource savings; however, given the somewhat imprecise results, we recommend additional analysis.

These dramatically different results by risk category suggest that the effect of reduced requirements on the low risk soldiers is driven by the *additional* courses that are optional for the low risk treatment group but not for the medium risk treatment group (i.e., the Gap Analysis/MOS Crosswalk, Individual Assessment Tool, and Continuum of Military Service courses). In practice, around half of soldiers completed these courses even when they were not required to. Reducing these three course offerings to try to achieve resource savings (or implementing a policy that prohibited certain individuals from attending these courses) could increase unemployment applications even more.<sup>30</sup>

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<sup>30</sup> Appendix Table A4 uses an instrumental variables (IV) design with a pooled low and medium risk sample to estimate the effect of taking different groupings of courses. Treatment status and treatment status interacted with an indicator for low risk group are used to instrument for low risk and low/med risk optional course completion. As



#### *VI.D. Program Effects on Unemployment Duration*

While UCX application is an important measure of soldiers' transitions into the civilian labor force, it only describes program effects on the extensive margin. For 35 states, we also observe richer measures of UCX duration.<sup>31</sup> In Table 5, we restrict our analysis to the subsample of soldiers that transition to these states in order to estimate the effect of reduced course requirements on UCX duration. To determine if this restriction generates sample composition issues, we first estimate program effects on UCX applications (as in Table 4) to determine if these 35 states differ from the full set of states used above. We find that the estimated effects on UCX applications for this subsample are slightly larger but qualitatively similar to those in Table 4.

In Panel B, we estimate the effect of reduced course requirements on UCX duration (in weeks). We find that reduced requirements increase the time spent on UCX by 0.34-0.44 weeks for low risk soldiers. These effects are very large (43-55%) relative to the control mean of 0.8 weeks and statistically significant ( $p < 0.01$ ). In Panel C, we evaluate the program effects on the distribution of UCX durations. We find that the average effect from Panel B derives primarily from an increase in long UCX durations (more than 16 weeks). Reducing the program requirements approximately doubles the probability of these long UCX durations (1.4-1.7 pp effects on a control mean of 1.5 – 1.6 percent). Figure 1 shows similar results graphically. It depicts a series of OLS estimates of  $\beta$  from equation 3 (and 95% confidence interval) for separate regressions where the dependent variable is an indicator for UCX usage of more than the given number of weeks. Relative to the mutually exclusive indicators used in Table 5 Panel C, Figure 1

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expected, the IV results are larger in magnitude than the main OLS results and suggest that increased course completions (i.e., the Gap Analysis/MOS Crosswalk, Individual Assessment Tool, and Continuum of Military Service courses) reduce unemployment applications.

<sup>31</sup> The states for which we observe UCX billing data are AK, AL, AZ, CO, CT, DE, GA, HI, ID, IN, KS, KY, LA, MA, MD, MI, MN, MO, MS, MT, NC, NE, NH, NJ, NM, NY, OH, OR, PA, SC, SD, TX, UT, WI, and WV.

exploits inclusive indicators that account for the effects on the extensive and intensive margins. Taken together, the Table 5 and Figure 1 results suggest that the effect of reduced transition program requirements on low risk soldiers was persistent, and did not simply represent an issue of the new job start timing. There are no statistically significant effects on UCX duration for medium risk soldiers in either Table 5 or Figure 1. With 95% confidence we can only rule out UCX duration increases of 0.5 weeks (Panel B column 6) for soldiers in this group.

## **VII. Discussion: Applying Predictive Analytics to Management and Policy Problems**

Pairing predictive analytics with a pilot program akin to a randomized controlled trial yields substantial advantages to any organization considering a policy change. While predictive analytics enable the identification of target groups based on past observations, on its own they provide little useful information about how these groups will be impacted by a new policy or environment that has not been observed in the past. Similarly, experimental evaluations can yield reliable estimates of program effects, but they typically do so only for an average individual. Pairing predictive analytic models with experimental pilot programs substantially increases the impact of research in support of data driven decision-making and evidence-based policy-making.

In this study, we document the value of such an approach for one of the nation's largest organizations, the U.S. Army, on an issue of strategic importance, Veteran unemployment.<sup>32</sup> We designed and implemented a large-scale pilot program that leveraged administrative data, a robust predictive analytic model, and a randomized field experiment to evaluate the effects of tailored transition program requirements on individual unemployment outcomes. Contrary to *a priori*

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<sup>32</sup> There are approximately 480,000 Army soldiers on active duty, with an additional 190,000 in the Reserves, and 330,000 in the National Guard.

predictions, we find that reducing course requirements increased the probability of applying for unemployment, and the duration of unemployment even for soldiers predicted to be well situated to transition to the civilian labor market. Reducing course requirements (by five courses) for the low-risk group increased the probability of applying for unemployment by 3 percentage points (approximately 30%) and the duration of unemployment by 0.44 weeks (54%). Reducing course requirements for the medium risk group (by two courses) had no statistically significant effects on either unemployment outcome, but we cannot rule out a meaningful changes in either direction.<sup>33</sup>

These results suggest the importance of piloting and experimentation in program design. While program leaders and administrators had focused primarily on the time and financial costs of the transition courses, they had underestimated the long-run benefits of transition program components in a way that could only be determined with a carefully designed experiment. Had the Department of Defense decided to forego the pilot program and instead implement the reduced requirements for low-risk active duty servicemembers in all military branches worldwide, the adverse effects could have been large. Under reasonable assumptions, this decision could generate approximately 1,100 additional UCX applications, 16,000 weeks of UCX benefit payments, and an estimated cost exceeding five million dollars each year.<sup>34</sup>

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<sup>33</sup> The pilot program had no effects on the duration of military service (see Appendix Table A3). As a result, we can rule out that the pilot program induced individuals to reenlist at differential rates and that treatment and control individuals experienced differential time in military service to prepare for their transition.

<sup>34</sup> For these calculations we assume: 1)  $n=200,000$  UCX eligible servicemembers separate each year from all military services; 2) the proportion of individuals ( $\lambda$ ) classified as low-risk (18%) are the same in the Army and the other services; 3) the program would have the same effects (same betas) in the other services as in the Army; 4) the average monthly pay for a separating soldier is \$2,555 (the fiscal year 2019 basic pay for an E4 with 4 years of service); and 5) the average UCX benefit amount is 50% of pay (Carter and Miller 2015). Combining these assumptions with our preferred regression estimates (column 3 from Tables 4 Table 5 Panel B), we find:

1.  $\#Applications = \#Separations \times \lambda_{Low-Risk} \times \beta_{UCX\ Application} = 200,000 \times 0.18 \times 0.032 = 1,166$
2.  $UCX\ Benefit\ Weeks = \#Separations \times \lambda_{Low-Risk} \times \beta_{UCX\ Duration} = 200,000 \times 0.18 \times 0.437 = 15,919$
3.  $UCX\ Cost = \#UCX\ Benefit\ Weeks \times Avg\ Cost\ Per\ Week = 15,919 \times [\$2,555 \times 0.5 \times 0.25] = \$5,084,268$

The size of the potential costs for DOD likely exceed that of any civilian employer. Nonetheless, private sector firms face similar obligations for unemployment insurance. In addition to these significant cost considerations, there are reputational and talent management implications for off-boarding (see Section IIA).

We turn briefly to policy recommendations in light of our research and the broader movement towards evidence-based policy-making. The most reasonable policy recommendations for the Department of Defense based on our findings include: targeted and tailored transition services are worthwhile efforts; eliminating or relaxing course requirements for the three courses evaluated here (i.e., the Gap Analysis/MOS Crosswalk, Individual Assessment Tool, and Continuum of Military Service courses) seems inadvisable; reducing the requirement for two courses (i.e., the 12 Month Post-Separation Budget and the Job Application Package) appears to have a minimal effect on unemployment applications, though we cannot rule out small increases in unemployment duration suggesting that further evaluation may be in order; and, finally, it is valuable to continue to design and execute large scale experimental evaluations for future policy reforms within and beyond the transition program. While such programs are challenging and time intensive, they are likely to yield high quality evidence capable of informing improved policy.

The present study was unique in its scale and method, as well as in supporting policy-making by a large public sector organization. Given the simultaneous desire for more data-driven decision-making and evidence-based policy-making among organizations discussed above (Triantafillou 2015, Head 2013, 2008; Liebman 2013; Bogenschneider and Corbett 2010), as well as the challenges in executing these approaches (Oliver et al. 2014; Head 2013), we briefly discuss some program elements that align with “best practices” for such efforts in the management, public management, and public policy literatures. Strydom et al. (2010) suggest such demonstrations

may be uniquely valuable, though we caution that our reflections are preliminary and observational.

Our perceived “best practices” rely primarily on previous and current roles as government analysts, or “insiders,” to be able to relate to decision-makers during the design, execution and analysis phases of the project. Given previous work between the Office of Economic and Manpower Analysis and the Transition Assistance Program office, we leveraged personal relationships as advised by Oliver et al. (2014) to defeat the stereotypes of self-serving policy-makers and egg-headed and absent-minded professors highlighted by Bogenschneider and Corbett (2010). Importantly, the analysts and their office had the requisite “policy analytic capability” cited by a number of researchers (Parkhurst 2017; Liebman 2013; Howlett 2009) as critical for credibility during and after the project is complete. Nevertheless, the researchers worked diligently to ensure they understood policy-maker objectives, the policy environment, and likely challenges, all part of what by Strydom et al. (2010) call the “real and nuanced understandings of the context.” Researchers complemented these efforts with appropriate pragmatism (Cairney and Oliver 2017) in design and execution. Together, these efforts had the effect of increasing trust from the policy-makers as advised by Oliver et al. (2014).

Our research supports creating and sustaining organizational commitments from managers in all sectors to data-driven decision-making and evidence-based policy-making. It also provides rigorous evidence on important questions related to facilitating employee transitions, especially for the all-volunteer military. We hope, more generally, that this study documents the potential for organizations to adopt rigorous scientific approaches, namely combining predictive analytic models and experimental pilot programs, to address pressing financial, economic and social issues.

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