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Employee retention and psychological health: evidence from military recruits

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We estimate the relationship between psychological attributes of US Army recruits soon after enlistment and their propensity to leave service. We find that those with the worst psychological health are more likely to terminate employment, and we show how identifying psychologically unfit candidates prior to their employment can reduce the likelihood of future turnover and associated personnel costs. These findings have broad application to other stressful occupations such as firefighters, policemen and first-responders.

Keywords: retention; psychological health; attrition; military; recruiting

JEL Classification: J08; J32; J45; J30

I. Introduction

Psychological health is vital for many high-stress occupations, such as police officers, firefighters, emergency responders and military service members. Psychologically unfit employees may be more likely to quit, which burdens employers with the costly task of recruiting and training replacements. In this article, we explore the feasibility of using a psychological assessment to identify and screen out prospective employees with poor psychological health.

The population we study is new recruits to the US Army. Recruits sign multi-year employment contracts that can only be broken by the employer (the military). Consistently, one quarter of the approximately 70 000 new recruits per year are found to be unfit for military service at some time during their contracted term and are discharged. Such a discharge – defined as attrition – is costly because a replacement must be recruited and trained; estimates of the average cost per attrite are upwards of $27 000 (Enns, 2012). Attrition can occur for a variety of reasons, from discipline problems, to use of illicit substances, to poor mental or physical health, and the Army actively pursues policies to reduce attrition. Past studies have shown that attrition is correlated with various pre-employment factors such as demographics and physical health problems (e.g.

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obesity or prior injuries), and the Army indeed screens recruits on these dimensions (Knapik *et al.*, 2004). Yet, despite pressure from the federal government to further reduce attrition costs (GAO, 1997), we have no evidence to date whether psychological health measures can predict soldiers' likelihood of attrition, and thus be used as a screening instrument.

This shortcoming in part stems from the fact that psychological health measures of new recruits have only recently become available. In 2009, the Army began administering the Global Assessment Tool (GAT) to all new soldiers. The GAT is an online, self-administered questionnaire that captures 14 attributes of psychological health and resilience deemed important for military life. Currently, the GAT is used only for self-awareness purposes and not shared with leadership. All new recruits are required to complete the GAT within the first few weeks of their initial training and then on an annual basis.

We find that psychological attributes as captured by the GAT are significantly and meaningfully correlated with a soldier's future propensity to attrite. Knowing how well these psychological attributes predict first-term attrition can allow the Army to identify a workforce that is a better fit for its unique environment, and it can potentially reduce personnel costs in an era of increasing fiscal austerity. To our knowledge, this methodology has not been widely applied in other high-stress occupations, and we show it has the potential to significantly improve labour market outcomes.

II. Data and Sample

Data

We use three sources of data provided by the US Army: individuals' item-level responses to their first GAT test, a database identifying when and why a soldier left employment and a master personnel database containing demographic characteristics.

Psychological attributes. The 14 GAT attributes are depression, catastrophizing, positive affect, adaptability, coping ability, optimism, character, family satisfaction, family support, engagement in the workplace, friendship, loneliness, organizational trust and spiritual fitness. For full details of the GAT questionnaire, see Lester *et al.* (2011).

Theoretically, all of these attributes can influence soldier attrition. They reflect not only *in situ* psychological health (e.g. depression, affect), but also how a person might respond to stressors endemic to military life (e.g. optimism, catastrophizing). The more contextual and philosophical attributes (e.g. positive affect, spirituality) can reflect how soldiers respond to trust in leadership, and violations of trust can precipitate attrition. Last, resilience can stem from a support network, and a lack of friendship (or loneliness) or family support for service in the Army could again precipitate attrition in response to adverse events.

The 105 individual GAT questions are collected as either binary responses or on a 5- or 10-point scale. We standardize individual questions to be within a scale of 1 to 5 and define the GAT score for each attribute as the average of the individual item responses. We find similar results using different aggregations of the GAT questions (available upon request). For all attributes except two, a higher scale reflects more positive psychological attributes; the two other attributes – depression and catastrophizing – are reverse coded for consistency.

Attrition. The length of a first-term contract for most soldiers is usually 4 years, but is sometimes 3 years for certain specific occupations. As available data do not identify term length, we follow the literature (e.g. Golding *et al.*, 2001) and define attrition as leaving the Army for any reason except for education prior to their first 36 months of service. In unreported results, we find that the vast majority of attrition occurs with the first year of employment, which suggests that little information is lost by using a 3-year attrition window.

Sample

Our sample includes 17 226 enlisted soldiers without prior military service who took the GAT within 4 weeks of starting basic training and whose initial service date was in fiscal year 2010. Before 1 October 2009, the GAT questionnaire was not standardized; for those entering the Army after 1 October 2010, we do not have sufficient time to observe 36-month attrition. Table 1 shows that 28% of the sample attrited. The majority of the sample is male,

Table 1. Descriptive statistics of the attrition analysis sample

	All		Nonattrites		Attrites		
	Mean	(SE)	Mean	(SE)	Mean	(SE)	*p*-value (2) = (3)
	(1)		(2)		(3)		(4)
Attrited within the first 36 months	0.28	(0.003)					
Male	0.79	(0.003)	0.82	(0.004)	0.71	(0.006)	0.000
Age	21.42	(0.033)	21.61	(0.004)	20.93	(0.006)	0.000
Race/ethnicity							
White	0.63	(0.003)	0.63	(0.004)	0.64	(0.007)	0.206
Black	0.20	(0.003)	0.19	(0.004)	0.21	(0.006)	0.011
Hispanic	0.12	(0.002)	0.12	(0.003)	0.10	(0.005)	0.000
Asian	0.05	(0.002)	0.05	(0.002)	0.05	(0.003)	0.734
Other race	0.01	(0.001)	0.01	(0.001)	0.01	(0.001)	0.681
Highest educational attainment							
High school	0.88	(0.002)	0.86	(0.003)	0.92	(0.005)	0.000
College	0.11	(0.002)	0.13	(0.003)	0.08	(0.005)	0.000
Graduate school	0.01	(0.001)	0.01	(0.001)	0.01	(0.001)	0.044
Marital status							
Single	0.80	(0.003)	0.79	(0.004)	0.82	(0.006)	0.000
Married	0.19	(0.003)	0.20	(0.004)	0.17	(0.006)	0.000
Divorced	0.01	(0.001)	0.01	(0.001)	0.02	(0.002)	0.021
AFQT percentile	61.63	(0.149)	62.51	(0.175)	58.37	(0.282)	0.000
Occupation							
Combat arms	0.24	(0.003)	0.24	(0.004)	0.24	(0.006)	0.417
Combat support	0.18	(0.003)	0.18	(0.003)	0.17	(0.006)	0.269
Combat service support	0.35	(0.004)	0.33	(0.004)	0.40	(0.007)	0.000
Aviation	0.06	(0.002)	0.06	(0.002)	0.05	(0.003)	0.002
Other occupation	0.18	(0.003)	0.19	(0.003)	0.15	(0.005)	0.000
Observations	17 229		12 451		4778		

Notes: Sample includes all first-term US Army recruits who started initial training and took the GAT between 1 October 2009 and 1 June 2011.

white, single and has no college education. The average age is 21 years, and only 24% were involved in a combat arms occupation. Attriters more often are female, younger and single, have a lower Armed Forces Qualifying Test (AFQT) score (an ability test taken by potential recruits) and have no post-high school education.

III. Methods

We first study each GAT attribute independently by comparing the distribution of scores for attriters and nonattriters and presenting attrition rates amongst soldiers in various percentile groups of the study population's GAT distribution.

As employers will likely be concerned with identifying those with the lowest psychological health, we next concentrate on differences between those with the lowest GAT scores and the remainder of the sample. For brevity, we only present results comparing soldiers in the bottom 5 percentiles to those in the top 95 percentiles of the distribution for each attribute. Specifically, we estimate logistic models predicting the likelihood of attrition as a function of being in the lowest 5 percentiles of each attribute and control for the covariates presented in Table 1. In unreported analysis, we reach similar conclusions when choosing any other cut-off below the 10th percentile.

IV. Results

Figure 1 shows kernel densities of GAT scores by attrition status. The distributions of all GAT scores are shifted to the left amongst attriters compared to nonattriters (Kolmogorov–Smirnov tests strongly reject the equality of these distributions for all attributes). The magnitude of differences in GAT scores

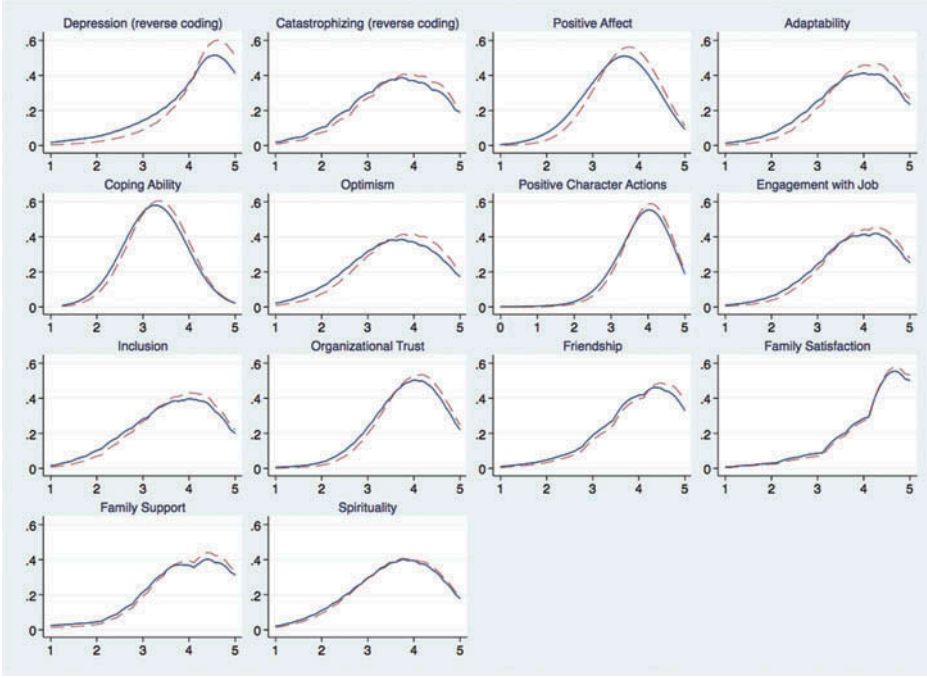

Fig. 1. The distribution of GAT scores by GAT attributes and attrition status (dashed = nonattriters; solid = attriters)

between attriters and nonattriters is largest for depression, positive affect and adaptability and smallest for family satisfaction and spirituality.

Figure 2 shows one useful way to focus on soldiers with the lowest GAT scores: bar charts of attrition rates within various percentiles of the distribution of GAT scores. For each attribute, the attrition rate is higher in the lowest 5 percentiles compared to the 6–25th percentiles, and for most attributes, this difference is the largest amongst the percentile groups shown.

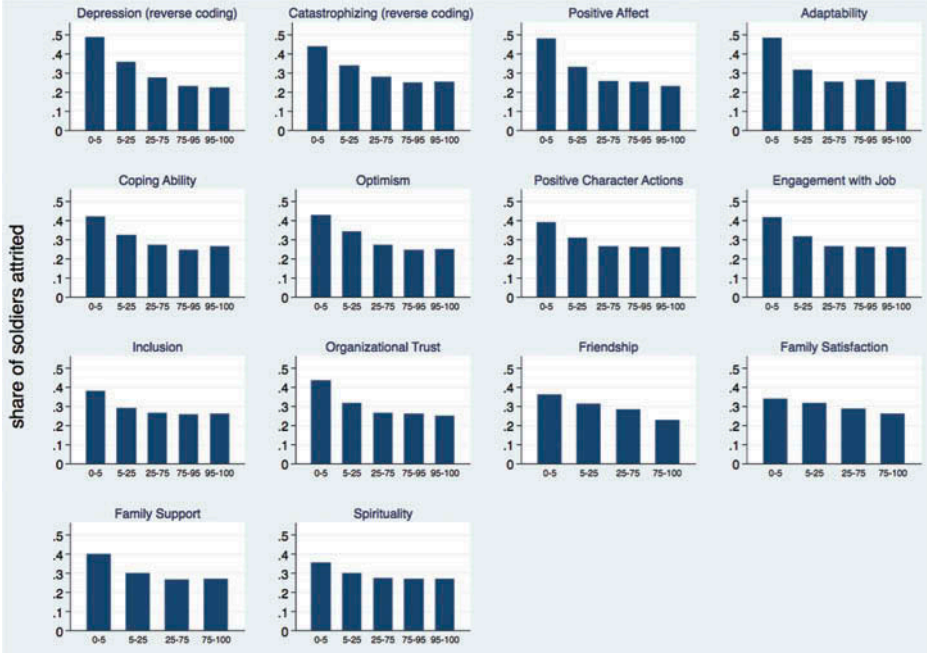

Fig. 2. Attrition rates amongst soldiers in various percentile ranges of GAT scores by attributes

Table 2. Odds ratios of attriting as a function of being in the lowest 5th percentile of the GAT

	Ever attrite		Ever attrite	
	Odd ratios	(SE)	Odd ratios	(SE)
	(1)		(2)	
Lowest 5th percentile of GAT category				
Depression (reverse coding)	1.667***	(0.125)	1.543***	(0.118)
Catastrophizing (reverse coding)	1.054	(0.081)	0.999	(0.078)
Positive affect	1.336***	(0.110)	1.335***	(0.112)
Adaptability	1.591***	(0.132)	1.521***	(0.128)
Coping ability	1.074	(0.087)	1.044	(0.086)
Optimism	1.352***	(0.093)	1.357***	(0.095)
Positive character actions	1.081	(0.089)	1.094	(0.091)
Engagement with job	1.247***	(0.092)	1.234***	(0.092)
Inclusion	1.147**	(0.077)	1.135*	(0.077)
Organizational trust	1.264***	(0.097)	1.234***	(0.097)
Friendship	0.959	(0.084)	0.981	(0.087)
Family satisfaction	1.084	(0.066)	1.035	(0.064)
Family support	1.305***	(0.101)	1.318***	(0.104)
Spirituality	0.806***	(0.065)	0.858*	(0.070)
Male			0.563***	(0.024)
Age			0.978***	(0.005)
Race/ethnicity				
Black			0.857***	(0.041)
Hispanic			0.670***	(0.040)
Asian			0.956	(0.081)
Other			0.901	(0.183)
Highest educational attainment				
College			0.730***	(0.051)
Graduate school			2.106***	(0.414)
Marital status				
Married			0.963	(0.050)
Divorced			1.628***	(0.253)
AFQT percentile			0.992***	(0.001)
Occupation				
Combat support			0.899*	(0.051)
Combat service support			1.001	(0.048)
Aviation			0.752***	(0.064)
Other occupation			0.829***	(0.049)
Observations	17 226		17 226	

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. GAT = Global Assessment Tools; AFQT = Armed Forces Qualifying Test.

We next allow the GAT attributes to jointly predict attrition in a logistic model. Column 1 of Table 2 shows that the largest attrition differences are present for two attributes: depression and adaptability. Conditional on other GAT attributes, those in the bottom 5% of the distribution for the depression (the most depressive) are 1.54 times more likely to attrite than those in the top 95% of the distribution. Those in the bottom 5% for positive affect, optimism, engagement, organizational trust and family support are also more likely to attrite. Interestingly, low spirituality scores are associated with lower attrition during the first term, which may reflect that spiritual individuals discover they have moral conflicts with the realities of military service.

Controlling for individual-level covariates in column 2 changes the point estimates on GAT variables very little. This suggests that the variation in psychological health is mostly independent of observable demographics, and that the GAT adds meaningfully to the Army's ability to predict future attrition.

V. Conclusion

We have demonstrated that a set of self-reported questions can predict employee retention. Our results have important implications for recruiting strategies in the Army and other large organizations with stressful work environments. However, if the Army is to consider using psychometric screening, it must be sure the policy's benefits outweigh its costs.

On one hand, screening out soldiers with low GAT scores will reduce training and personnel costs, as fewer soldiers would need to be hired. On the other hand, screening based on the GAT alone is a blunt policy instrument: many low-GAT recruits (who would be screened out in this policy) would have satisfactorily completed their contractual term, forcing the Army to recruit and train more soldiers.

To illustrate, suppose the Army screens out recruits who scored in the bottom 5 percentiles of the depression attribute before they enter initial training.[1] Compared to the status quo, we estimate that yearly recruiting expenditures would increase by $15.8 million, but $5.4 million would be saved on enlistment bonuses and $16.7 million saved in training/personnel costs. Thus, this hypothetical policy would save $6.3 million per year in personnel cost alone, and savings could be higher if the Army chose the screening cut-off optimally.[2]

We advocate future research on the relationship between psychological screening and worker retention (or other worker performance measures) across a range of settings with different work stress levels in order to further our understanding of the role and effectiveness of psychological screening on labour market outcomes.

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Supplemental data

Supplemental data for this article can be accessed here.

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[1] See the Supplemental data for the details of these calculations.

[2] There are likely other benefits and costs of screening; for example, screening could lower medical expenditures or reduce the incidence of catastrophic, psychologically induced events such as the recent shootings at Fort Hood, Texas.