Summary of Recruit Assessment Program Survey Prediction of Military Personnel Outcomes

Diane Williams

James C. Yea

Yunnuo Zhu

Warfighter Performance Department
Naval Health Research Center
140 Sylvester Road
San Diego, CA 92106-3521

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EXECUTIVE SUMMARY

Introduction: Many factors could be predictive of problems with successful military service, some of which are characteristics of the recruits when they access to service. Despite efforts to provide exemplary military leadership and training, some recruits will be unsuccessful in military service and attrite, or develop drug use disorder, or fail to deploy, or receive an unfavorable reenlistment indicator. Although recruiting efforts have been focused on intelligence and education of incoming recruits, there may be other factors that are equally important in determining whether or not recruits will be successful during military service.

Method: Data from approximately 100,000 Marines collected from 2003 to 2013 using the Recruit Assessment Program (RAP) survey were analyzed in this case-control study. Predictors included Descriptive Factors, Prosocial Factors, Childhood Adversity, Psychological and Behavioral Issues, and Substance Use. Six personnel outcomes were included: attrition from military service before 4, 12, and 48 months of service, drug use disorder diagnoses, deployment status, and the favorability of the reenlistment indicator, which establishes reenlistment eligibility. The relationship of predictors to personnel outcomes was determined in a series of six logistic regressions.

Results: Most of the predictors were related to personnel outcomes (83%). All classes of predictor variables were related to personnel outcomes for at least one level of one predictor. Some Descriptive Factors enhanced the odds of successful military service (education and intelligence), while others decreased the odds (older age at accession, and body mass index outside the normal range). Prosocial Factors were associated with increased odds of successful service. Childhood Adversity and Psychological and Behavioral Issues were associated with decreased odds of successful military service. Substance Use had a mixed pattern for higher scores on the Alcohol Use Disorders Identification Test (AUDIT) and use of smokeless tobacco—both were protective against attrition but associated with increased odds of drug use disorder. Additionally, higher scores on the AUDIT were associated with failure to deploy and with receiving an unfavorable reenlistment indicator. Use of smoking tobacco was consistently related to negative personnel outcomes.

Discussion: Data collected by the RAP survey program are predictive of militarily relevant personnel outcomes. Knowledge of the characteristics of Marines who are vulnerable to unsuccessful military service may allow their support to increase their chances of success during military service. These data may facilitate evidence-based management of incoming recruits.

Summary of Recruit Assessment Program Survey Prediction of Military Personnel Outcomes

Many factors could be predictive of problems with successful military service, some of which are characteristics of the recruits when they access to service. Despite leadership's efforts to provide exemplary military leadership and training, some recruits will be unable to fulfill their service contracts and will attrite from military service. Others will develop drug use disorder, which decreases their readiness and increases their risk of attrition. Some will not deploy. Others will not be allowed to reenlist after they separate from service. While recruiting efforts have been focused on intelligence and education of incoming recruits, there may be other factors that are equally important in determining whether or not recruits will be successful during their military service.

The Recruit Assessment Program (RAP) survey is designed to determine the health and behavioral histories of incoming Marine Corps recruits, along with demographic characteristics (Barrett et al., 2002; Lane et al., 2002; Young et al., 2006). The initial version of this survey was created in 1999 and has been revised periodically (Lane et al., 2002). Since 2001, it has been administered to thousands of Marine recruits at Marine Corps Recruit Depot San Diego. It is the only known database that systematically collects pre-enlistment Marine Corps data as part of a research study.

This survey collects several types of information, including descriptive factors (e.g., demographic information like accession age, education, and intelligence) and prosocial factors (e.g., having friends, engaging in exercise, and playing team sports during high school), that may be associated with beneficial personnel outcomes. It also collects information about childhood adversities associated with adverse outcomes: household instability (Gilman et al., 2003), parental separation (Green et al., 2010), childhood poverty (De Coster et al., 2006; Nikulina et al., 2011; Paxton, et al., 2004; Samson & Laub, 1994), ACES childhood experiences (ACEs; Felitti et al., 1998), and exposure to potentially traumatic events (Kessler, David & Kendler, 1997). The RAP survey also collects data on psychological and behavioral issues (mental health problems at accession, history of attention-deficit/hyperactivity disorder [ADHD]), engaging in problematic conduct (failure to follow rules and laws), and substance use (use of smokeless or smoking tobacco, alcohol intake), all of which may be associated with adverse personnel outcomes. Because these adversities frequently co-occur (Dong et al., 2004), inclusion of several of these factors in a model improved the estimated accuracy of the unique effect of these factors (Green et al., 2010).

There are several indicators of successful military service. A commonly researched indicator is completion of the service contract. Failure to complete the service contract, or military attrition, may occur shortly after accession, or up to 4 years after accession, the standard length of the service contract. Depending on the situation, earlier attrition of a Marine who is going to attrite may be more beneficial. For Marines whose military occupational specialty (MOS) requires more expensive training, earlier separation—before they have received specialized training—is preferable. Alternatively, Marines who separate very early do not provide military service to offset the costs incurred in their recruitment and processing. Apart

from failure to complete the service contract, other indicators of unsuccessful military service are receiving a diagnosis of drug use disorder, lack of deployment, and receiving an unfavorable reenlistment indicator. Receipt of a drug use disorder diagnosis frequently leads to separation, and it limits the ability to reenlist (Stander et al., 2003). Failure to deploy may be related to being assigned to an MOS that is less likely to deploy, but it also may reflect not meeting criteria to deploy. The reenlistment indicator is an appraisal of the service member's performance. A negative indicator prevents the service member from reenlisting.

In the present study, we hypothesized that RAP survey information collected on descriptive and prosocial factors, as well as childhood adversity, psychological and behavioral issues, and substance use would be predictive of militarily relevant personnel outcomes. The six personnel outcomes selected for this study were attrition from military service before 4, 12, and 48 months of service, drug use diagnosis, deployment, and the status of the reenlistment indicator. We also sought to determine the strength of any associations.

Method

Subjects initially included Marines first enlisting between 2003 and 2013 who completed the RAP survey and had available medical and personnel data in the Career History Archival and Medical Personnel System (CHAMPS; Gunderson et al., 2005). CHAMPS, an electronic database maintained by the Naval Health Research Center, includes details of inpatient and outpatient medical encounters from military providers reimbursed via TRICARE Management Activity during active military service, except for medical encounters that occur in a combat zone (Gunderson et al., 2005). To ensure comparability of the sample, recruits who were not active duty with prior military service and Marines who died during the study observation period were excluded. The number of records in the various outcome studies ranged from 91,199 for the Reenlistment Indicator to 108,218 for drug use disorder diagnosis during service in this case-control study. After identifying the appropriate records for each study, the records were separated into groups for each outcome. For example, for Reenlistment Indicator, they were separated into those who received a positive reenlistment indicator, which would allow them to reenlist, and those who received a negative reenlistment indicator, which would not.

The RAP survey is administered to Marine recruits who have provided their informed consent to take this survey after being assured that their individual data are confidential and will only be released to the Marine Corps after being aggregated with data from other individuals. Data from the RAP survey were linked with personnel data from the CHAMPS database to allow determination of adverse attrition from military service before 4 months, 12 month, or 48 months of service; whether the Marine deployed during service; and whether the Marine received a negative or positive reenlistment indicator. Adverse attrition is attrition due to medical/behavioral issues and is the modal type of attrition. It excludes disability discharge and discharge for conditions that existed prior to service (Accession Medical Standards Analysis & Research Activity, 2019).

Data on drug use disorder diagnosis received during military service were obtained from CHAMPS (Gorham et al., 2004; Gunderson, Miller, & Garland, 2002). Marines who received

one or more drug use disorder diagnoses with *International Classification of Diseases, Ninth Revision* (ICD-9) codes 304–305.9 were included as having received a drug use disorder diagnosis.

Measures

Descriptive Factors. Information about sample characteristics was derived from both CHAMPS data and the RAP survey. Age at accession was determined by subtracting the birthdate from the date of accession from personnel records in CHAMPS. CHAMPS also provided data about Armed Forces Qualification Test (AFQT) scores, which are derived from the Armed Services Vocational Aptitude Battery. AFQT scores are an index of intellectual ability (Frey & Detterman, 2004; Kennedy, Kupke, & Smith, 2000; Orme, Brehn, & Ree, 2001). AFQT performance, which is reported in categories I–IVA (CATs I–IIIA are average or above, CATs IIIB–IVA are below average), was used for data analysis. Height, weight, and level of education data were taken from the RAP survey and were characteristic of the recruits when they accessed to service.

Prosocial Factors. These measures included questions about the number of close friends the person had, how often the person engaged in aerobic exercise, and the number of team sports the person engaged in during their last year of high school. Responses were dichotomized.

Childhood Adversities. These measures included questions about household instability, separation from parents, childhood poverty; ACE survey score; and exposure to potentially traumatic events. Childhood household instability was determined by a response to a question regarding where the person was raised that indicated the family had moved around to different places. Separation from parents was determined from a question that asked the respondent who had raised them. Responses other than that one or both parents raised them were coded as parental separation. Childhood poverty was based on response to a question that asked whether the family was well-off or they had to financially struggle to meet essential needs some or most of the time.

The ACE measure was assessed using nine questions modified from the original ACE questionnaire (Anda et al., 1999). The ACE questions inquired about having a caregiver/protector; feeling loved; experiencing verbal, physical, or sexual abuse; living with someone who was mentally ill or had an alcohol abuse problem; and parental divorce. Responses to the ACE items were summed.

Exposure to potentially traumatic events was assessed using seven RAP questions that inquired about involvement in a potentially fatal accident, seeing a stranger or close family member being badly hurt or killed, being threatened with a weapon, and being raped. All individual responses were summed. These items were modeled on questions used in the National Comorbidity Survey (Kessler et al., 1995).

Psychological and Behavioral Issues. The respondent's mental health status, ADHD history, extent of participation in problematic behavior, and motivation to join the service were determined. Personal mental health status was assessed using items that asked about self-harm,

seeking mental health care, feeling depressed, being nervous, problems reasoning, being forgetful, paying attention, concentrating, interference of physical health problems with social activities, and interference of mental health problems with accomplishing goals or not working carefully. Responses to this scale were summed. Most of these questions were derived from the 36-Item Short Form Survey (Ware & Sherbourne, 1992), which has been used as a mental health screener (Gill et al., 2007) and to determine the prevalence of mental health problems (Kessler et al., 2005). ADHD history was determined by asking whether the person had ADHD or had taken medication for ADHD. Extent of participation in Problematic Conduct was determined by responses to questions about the age at which the person first engaged in regular smoking, drinking alcohol, and having sexual intercourse. Responses that the person was 15 or younger when they first engaged in these activities were counted. Responses to other questions about the occurrence of specific events, such as whether the person had been suspended or expelled from school, arrested, or fired, or had received three or more moving violations, were also counted. Several choices for motivations to join service were offered, but only the "to leave problems at home" motivation to join was included in this study.

Substance Use. Substance use was assessed for alcohol consumption and for use of smokeless tobacco (chew, dip, snuff), and smoking tobacco. Alcohol use was characterized using the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993). Any indication of use of smokeless or smoking tobacco was regarded as a positive history.

Outcome Variables. The outcome variables were (1) adverse attrition before 4 months of service, (2) adverse attrition before 12 months of service, (3) adverse attrition before 48 months of service, (4) drug use diagnosis during service, (5) deployment status during service, and (6) status of the reenlistment indicator.

Results

Multivariate logistic regressions were used to analyze each data set. Unadjusted odds ratios (ORs) were calculated for both outcomes groups and all variables with a p value <.05 were entered into an adjusted logistic regression model using a backward stepwise regression. Variance levels were checked, and no abnormal levels, confounding, or significant interactions were found during analysis. Nonsignificant variables were manually removed one at a time from the model if they did not confound the relationship between each main effect and reported mental health by more than 15%. The final adjusted model included only those covariates that were significantly associated with the outcome. Regression diagnostics, including examining covariates for multicollinearity and model fit by R2, were performed. All analyses were conducted using SAS statistical analysis software version 9.4 issued and copyrighted by the SAS Institute Inc., Cary, NC, USA.

Detailed results of each the six studies that investigated the relationship between RAP survey data and militarily relevant personnel outcomes are outside the scope of the present report. A summary of the results for variables included in all logistic regressions is shown in Table 1. Positive entries reflect the variable was significantly related to the outcome. For factors

with more than one level, positive entries indicate that at least one level of factor was significantly related to the outcome variable.

As seen in Table 1, 95 of the 114 factor-outcome pairs (83%) were significantly related. The percentage of predictive relationships by outcome ranged from 16 of 19 (79%) for Deployment to 17 of 19 (89%) for the Reenlistment Indicator. Several factors had ORs that were either <.65 or >1.50 (16%), which may be more operationally useful. These ranged from 2 of 19 (11%) for Attrition before 48 months and Deployment, to 4 of 19 (21%) for the Reenlistment Indicator. When analyzed by category of factors, there were predictive relationships that ranged from 12 of 18 (62%) for Prosocial Factors to 22 of 24 (92%) for Descriptive Factors., Overall, 20 of 114 (16%) factor-outcome pairs were strongly related. By predictor category, strongly related predictors ranged from none for Prosocial Factors, to 5 of 24 (21%) for Psychological and Behavioral Issues.

Discussion

The results support our hypothesis that RAP survey factors were predictive of personnel outcomes. Most RAP factors were related to military personnel outcomes, and some were associated with increased or decreased odds of at least 50%. These relationships were shown across all five factor categories and all six personnel outcomes.

Descriptive Factors were related to attrition, drug use disorder, deployment, and reenlistment. High school graduation and higher intelligence are used to determine a high-quality candidate for accession to the military (Buddin, 1988). The results showed that education and intelligence were related to success in military service. Accession age was also predictive of adverse personnel outcomes, consistent with previous reports showing that older recruits are less successful in military service (Laurence, Naughton, & Harris 1996; McBride, 1993; Talcott et al., 1999). Marines who had body mass index (BMI) values outside of normal values were mostly associated with adverse personnel outcomes, although there was an exception. The relationship with being either overweight or obese and attrition has previously been reported (Knapik et al., 2004), as has the relationship between being underweight and attrition (Haddock et al., 2007; Niebuhr et al., 2008; Poston et al., 2002; Reynolds et al., 1993). Being underweight was related to receiving an unfavorable reenlistment indicator. The exception to non-normal BMI scores predicting adverse outcomes was that obese Marines had increased odds of deployment, which may be related to BMI capturing the weight of greater musculature as well as capturing adipose tissue.

Significant Prosocial Factors were consistently protective against adverse outcomes. The beneficial effect of exercise was more difficult to demonstrate because there were so few Marine recruits who did not report engaging in aerobic exercise. Beneficial effects of exercise may reflect the beneficial effect of exercise itself, or of self-discipline (Deslandes et al., 2009; LeardMann et al., 2011; Penedo & Dahn, 2005; Raglin, 1990). Having engaged in team sports showed a different pattern of outcomes than exercise alone and may be related to having the social skills to navigate group dynamics. Previous research has shown a mental health advantage for team sport athletes compared with individual sport athletes (Pluhar et al., 2019). Social

support from having a close friend was also predictive of good outcomes and has been previously reported (Donovan, Jessor & Costa 1991). Lack of social support is a predictor of all-cause mortality (House, Landis, & Umberson, 1988).

Childhood adversities also were predictive of adverse personnel outcomes, with exposure to potentially traumatic events having the most substantial predictive relationships. Childhood adversities can interfere with the acquisition of social and emotional competence within the individual. They appear to affect children at a neuroendocrine level during development (McEwen & McEwen, 2017), altering their response to subsequent stressors (Taylor, 2010), and may lead to difficulties coping with stressors in adult life. Household instability may impair the development of social skills and is associated with behavioral problems (Wood et al., 1993) and illicit drug use (DeWit, 1998), consistent with our findings. Parental separation is potentially traumatic, and related to increased risk of psychiatric disorders (McLaughlin et al., 2012). Experiencing childhood poverty can affect emotional regulation in affected adults (Liberzon et al., 2015), impairing the ability to respond to stress. Problems with managing their own emotions and understanding the emotions of others may interfere with social competence. Poorer children may be less sensitive to positive social cues and more sensitive to negative social threat cues (Javanbakht et al., 2015; Taylor et al., 2006). Both parental separation and childhood poverty were associated with adverse personnel outcomes across all categories. Dysfunctional family life, indexed by ACEs, has previously been linked to increased substance use disorders (Anda et al., 1999; Dube et al., 2002; Farrugia et al., 2011; Fenton, 2013; Khoury et al., 2010; Wu et al., 2010). Families that have conflict and aggression can produce unpopular children, who are either overly aggressive or socially withdrawn (Repetti, Taylor, & Seeman, 2002). This may be the first report of the relationship of greater numbers of ACEs with failure to deploy and with receiving a negative reenlistment indicator.

Exposure to greater numbers of potentially traumatic exposures is related to greater vulnerability to mental health diagnoses, self-reported posttraumatic stress disorder (Phillips et al., 2010), and to attrition (Wolfe et al., 2005). Additionally, greater numbers of exposures may indicate that affected individuals put themselves in dangerous situations that resulted in adverse outcomes, and that this increased risk taking may be characteristic of these individuals (Sandberg et al., 1998; Swanson et al., 1994). This variable was strongly related to the majority of the adverse personnel outcomes.

The Psychological and Behavioral Issues of mental health problems, ADHD, Problematic Conduct, and joining service to “leave problems at home” were all predictive of adverse personnel outcomes. Mental health problems at accession have previously been reported to adversely affect military service (Booth-Kewley et al., 2002; Buckman et al., 2013; Carbone et al., 1999; Crawford & Fiedler, 1992; Larson et al., 2002; Merrill et al., 2004; Smikle et al., 1996). Military service difficulties of recruits with a history of ADHD are consistent with data from civilians. Civilians with ADHD have problems maintaining employment (Barkley et al., 1996, 2006), which may be related to their increased risk of injury (Able et al., 2006; Marcus et al., 2008; Merrill et al., 2009; Rowe, Maughan & Goodman, 2004) and their difficulties maintaining social relationships (Barkley, 2002; Barkley et al., 2006; Biederman et al., 2006;

Weiss & Murray, 2003). They also have problems with substance use disorders (Biederman et al., 1995; Halmøy et al., 2009; Kessler et al., 2006; Ohlmeier et al., 2008), which may be related to the increased impulsivity characteristic of the disorder. The Department of Defense screens for a history of ADHD and has specific requirements for the eligibility of affected individuals to join the service (U.S. Department of Defense, 2018). Inability to maintain attentional focus, and impulsivity, both characteristic of this disorder, may pose problems for military service. However, this may be the first report that the adverse effects of ADHD are also seen in U.S. service members who have accessed to service after screening. What may be more surprising in this category is that Problematic Conduct (failure to follow rules and laws) is related to adverse personnel outcomes (Bickel et al., 2001; Hunter 2014; Kendler et al., 2013). Problems complying with rules and laws and a history of high-risk tolerance both serve to compromise effective decision making and are associated with unsuccessful military service. People who join the military to leave problems at home have a history of having problems that may be related to poor decision making. Recruits who joined service to leave problems at home have greater odds of risky drinking at accession (Young et al., 2006) and early attrition due to drug use (White et al., 2016).

Substance Use was predictive of militarily relevant personnel outcomes, with the strongest predictive relationships for smoking tobacco at two packs per day or more. Interestingly, it is not tobacco itself that may produce adverse military outcomes. Smoking tobacco represents choosing to engage in a known risky behavior when other less risky alternatives are available. The decision to initiate smoking is predicted by rebelliousness and risk taking (Burt et al., 2000) and associated with defective processing in brain areas involved with decision making (Dinn et al., 2004). The use of smokeless tobacco both decreased the odds of attrition at two durations while raising the odds of receiving a diagnosis of drug use disorder. Similarly, low to hazardous alcohol use was protective against all durations of attrition, but it increased the odds of receiving a drug use diagnosis, not deploying, and receiving an unfavorable reenlistment indicator.

The RAP survey provides useful information to military leadership about factors that positively and negatively influence military service. These data suggest that the characteristics of recruits associated with adverse personnel outcomes may not prevent accession to military service but may interfere with successful military service. Determining the characteristics of recruits vulnerable to adverse outcomes is important. Some RAP predictive factors may be available from administrative data and could be used to identify recruits who may need additional support to be fully successful in military service. Information about other factors, such as mental health issues, could be obtained from process improvement surveys. The RAP survey provides information about how questions related to each factor could be phrased. While some of the burden of pre-accession adversities may be offset by the effect of strong leadership (Bartone, 2006), targeted psychological training for vulnerable service members may be beneficial (Williams et al., 2004). Remediating psychological vulnerabilities through training is similar to current efforts focused on increased physical training for recruits who struggle to maintain physical fitness standards.

The limitations of the study were the reliance on self-report for the RAP data and the reluctance of military personnel to seek treatment for substance use disorder problems, which served to decrease the estimated relationship between the predictors and that outcome variable. Another limitation was that our outcome measure relied on receiving a diagnosis of drug use disorder using ICD-9 codes, rather than restricting the outcome to require multiple substance use disorder diagnoses that were obtained under specific circumstances, such as from a mental health or substance use provider, and that the diagnoses be received within a certain time frame. Some of the Marines who received a single substance use disorder diagnosis may have received the diagnosis to "rule out" a specific disorder, rather than having a clinician determine that they met criteria for that disorder. Also, Marines who sought pastoral counseling or other counseling that did not result in medical diagnoses would not have been included as cases in this analysis.

Strengths of the study were the large sample sizes, the variety of predictive factors, use of drug use disorder diagnoses rather than screening instruments to determine caseness for drug use disorder problems, and use of administrative data for the balance of the outcomes. The large sample size allowed determination of the significance of smaller effects. The variety of risk factors used allowed the extent of the relationship between each factor and personnel outcome to be determined in the context of several other risk factors. The use of administrative data provides a more stringent criterion than provided by self-reported data. Restricting caseness for drug use disorder to diagnosed problems provides information about conditions that were not self-resolving and may have led to medical encounters.

Data collected by the RAP survey program are related to militarily relevant personnel outcomes. The RAP survey can provide useful information to military leadership about the factors that influence military performance. If administered outside a research setting, these questions could be used as the basis for a clinical referral to identify vulnerable recruits who may need additional support to be fully successful in military service. Information from the RAP could enable evidence-based management of Marines throughout their service careers.

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References

Able, S. L, Johnston, J. A., Adler, L. A., & Johnston, J. A. (2006). Functional and psychological impairment in adults with undiagnosed ADHD. *Psychological Medicine, 37*, 97–107.

Accession Medical Standards Analysis & Research Activity. (2019). *AMSARA annual report 2018*. https://www.wrair.army.mil/sites/default/files/2020-04/AMSARA_AR_2018_1.pdf

Anda, R. F., Croft, J. B., Felitti, V. J., Nordenberg, D., Giles, W. H., Williamson, D. F., & Giovino, G. A. (1999). Adverse childhood experiences and smoking during adolescence and adulthood. *JAMA, 282*, 1652–1658.

Barkley, R. A. (2002). Major life activity and health outcomes associated with attention-deficit/hyperactivity disorder. *Journal of Clinical Psychiatry*, *63*(suppl 12), 10–15.

Barkley, R. A., Fischer, M., Smallish, L., & Fletcher, K. (2006). Young adult outcome of hyperactive children: Adaptive functioning in major life activities. *Journal of the American Academy of Child and Adolescent Psychiatry*, *45*, 192–202. https://doi.org/10.1097/01.chi.0000189134.97436.e2

Barkley, R. A., Murphy, K., & Kwasnik, D. (1996). Psychological adjustment and adaptive impairments in young adults with ADHD. *Journal of Attention Disorders, 1*, 41–54.

Barrett, D. H., Duque, D., Engel, C. C., Friedl, K., Gray, G., Hogan, B, Hyams, K. C., Kaforski, G., Murphy, F., North, R., Riddle, J., Ryan, M. A., Trump, D. H., & Wells, J. (2002). The Recruit Assessment Program: A program to collect comprehensive baseline health data from U.S. military personnel. *Military Medicine, 167*, 44–47.

Bartone, P. T. (2006). Resilience under military operational stress: Can leaders influence hardiness? *Military Psychology 18*(Suppl), S131–S148. https://doi.org/10.1207/s15327876mp1803s_10

Bickel, W. K., & Marsch, L. A. (2001). Toward a behavioral economic understanding of drug dependence: Delay discounting processes. *Addiction, 96*, 73–86. https://doi.org/10.1046/j.1360-0443.2001.961736.x

Biederman, J., Faraone, S. V., Spencer, T. J., Mick, E., Monuteaux, M. C., & Aleardi, M. (2006). Functional impairments in adults with self-reports of diagnosed ADHD: A controlled study of 1001 adults in the community. *Journal of Clinical Psychiatry, 67*, 524–540. https://doi.org/10.4088/jcp.v67n0403

Biederman, J., Wilens, T., Mick, E., Milberger, S., Spencer, T. J., & Faraone, S. V. (1995). Psychoactive substance use disorders in adults with attention deficit hyperactivity disorder (ADHD): Effects of ADHD and psychiatric comorbidity. *American Journal of Psychiatry, 152*, 1652–1658.

Booth-Kewley, S., Larson, G. E., & Ryan, M. A. K. (2002). Predictors of Navy attrition. I. Analysis of 1-year attrition. *Military Medicine, 167*, 760–769.

Buckman, J. E., Forbes, H. J., Clayton, T., Jones, M., Jones, N., Greenberg, N., Sundin, J., Hull, L., Wessely, S., Nicola T., & Fear, N. T. (2013). Early Service leavers: A study of the factors associated with premature separation from the UK Armed Forces and the mental health of those that leave early. *European Journal of Public Health, 23*, 410–415. https://doi.org/10.1093/eurpub/cks042

Buddin, R. (1988). *Trends in attrition of high-quality military recruits* (Report #R-3539 FMP). RAND Corporation. https://apps.dtic.mil/sti/citations/ADA219577

Burt, R. D., Dinh, K. T., Peterson, A. V., & Sarason, I. G. (2000). Predicting adolescent smoking: A prospective study of personality variables. *Preventive Medicine, 30*, 115–125. https://doi.org/10.1006/pmed.1999.0605

Carbone, E. G., Cigrang, J. A., Todd, S. L., & Fiedler E. R. (1999). Predicting outcome of military basic training for individuals referred for psychological evaluation. *Journal of Personality Assessment, 72*, 256–265. https://doi.org/10.1207/S15327752JP720210

Crawford, S. L., & Fiedler, E. R. (1992). Childhood physical and sexual abuse and failure to complete military basic training. *Military Medicine, 157*, 645–648. https://doi.org/10.1093/milmed/157.12.645

De Coster, S., Heimer, K., & Wittrock, S. M. (2006). Neighborhood disadvantage, social capital, street context, and youth violence. *Sociological Quarterly, 47*, 723–753.

Deslandes, A., Moraes, H., Ferreira, C. Veiga, H., Silveira, H., Mouta, R., Pompeu, F. A., Coutinho, E. S., & Laks, J. (2009). Exercise and mental health: Many reasons to move. *Neuropsychobiology, 59*, 191–198. https://doi.org/10.1159/000223730

DeWit, D. J. (1998). Frequent childhood geographic relocation: Its impact on drug use initiation and the development of alcohol and other drug-related problems among adolescents and young adults. *Addictive Behaviors, 23*, 623–634.

Dinn, W. M., Aycicegi, A., & Harris. C. L. (2004). Cigarette smoking in a student sample: Neurocognitive and clinical correlates, *Addictive Behaviors, 29*, 107–126. https://doi.org/10.1016/j.addbeh.2003.07.001

Donovan, J. E., Jessor, R., & Costa, F. M. (1991). Adolescent health behavior and conventionality-unconventionality: An extension of problem-behavior therapy. *Health Psychology, 10*, 52–61. https://doi.org/10.1037/0278-6133.10.1.52

Dong, M., Anda, R. F., Felitti, V. J., Dube, S. R., Williamson, D. F., Thompson, T. J., Loos, C. M., & Giles, W. H. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse & Neglect, 28*, 771–784. https://doi.org/10.1016/j.chiabu.2004.01.008

Dube, S. R., Anda, R. F., Felitti, V. F., & Edwards, V. J. (2002). Adverse childhood experiences and personal alcohol abuse as an adult. *Addictive Behaviors, 27*, 713–725. https://doi.org/10.1542/peds.111.3.564

Farrugia, P. L., Mills, K. L., Barrett, E., Back, S. E., Teeson, M., Baker, A., Sannibale, C., Hopwood, S., Rosenfeld, J., Mertz, S., & Brady, K. T. (2011). Childhood trauma among individuals with co-morbid substance use and post-traumatic stress disorder. *Mental Health and Substance Use, 4*, 314–326.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. *American Journal of Preventive Medicine, 14*, 245–258.

Fenton, M., Geier, T., Keyes, K., & Skodol, A. E. (2013). Combined role of childhood maltreatment, family history, and gender in the risk for alcohol dependence. *Psychological Medicine, 43*, 1045–1057.

Frey, M. C., & Detterman, D. K. (2004). Scholastic assessment or g?: The relationship between the Scholastic Assessment Test and general cognitive ability. *Psychological Science, 15*, 373–378. https://doi.org/10.1111/j.0956-7976.2004.00687.x

Gill, S. C., Butterworth, P., Rodgers, B., & Mackinnon, A. (2007). Validity of the mental health component scale of the 12-item Short-Form Health Survey (MCS-12) as measure of common mental disorders in the general population. *Psychiatry Research, 152*, 63–71. https://doi.org/ 10.1016/j.psychres.2006.11.005

Gilman, S. E., Kawachi, I., Fitzmaurice, G. M., & Buka, S. L. (2003). Family disruption in childhood and risk of adult depression. *American Journal of Psychiatry, 160*, 939–946.

Green, J. G., McLaughlin, K. A., Berglund, P. A., Gruber, M. J., Sampson, N. A., Saslavsky, A. M., & Kessler, R. C. (2010). Childhood adversities and adult psychiatric disorders in the National Comorbidity Survey Replication I. *Archives of General Psychiatry, 67*, 113–123.

Gorham, E. D., Garland, F. C., Miller, M., & Gunderson, E. K. (2004). *The Career History Archival Medical and Personnel System (CHAMPS): An epidemiological data resource for force health protection* (Report No. ADA433771). Defense Technical Information Center. https://apps.dtic.mil/sti/pdfs/ADA433771.pdf

Gunderson, E. K., Garland, C. F., Miller, M. R., & Gorham, E. D. (2005). Career History Archival Medical and Personnel System. *Military Medicine, 170*, 172–175.

Gunderson, E. K., Miller, M. R., & Garland, C. F. (2002). *Career History Archival Medical and Personnel System (CHAMPS): Data resource for cancer, chronic disease, and other epidemiological research* (Report No. 02-06). Naval Health Research Center. https://apps.dtic.mil/sti/pdfs/ADA419547.pdf

Haddock, C. K., Pyle, S. A., Poston, W. S., Bray, R. M., & Stein, R. J. (2007). Smoking and body weight as markers of fitness for duty among U.S. military personnel. *Military Medicine, 172*(5), 527–532. https://doi.org/ 10.7205/milmed.172.5.527

Halmøy, A., Fasmer, O. B., Gillberg, C., & Haavik, J. (2009). Occupational outcome in adult ADHD: Impact of symptom profile, comorbid psychiatric problems, and treatment: A cross-sectional study of 414 clinically diagnosed adult ADHD patients. *Journal of Attentional Disorders, 13*, 175–187. https://doi.org/10.1177/1087054708329777

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science, 241*, 540–545.

Hunter, S. B., Miles, J. N. V., Pedersen, E. R., Ewing, B. A., & D'Amico, E. J. (2014). Temporal associations between substance use and delinquency among youth with a first-time offense. *Addictive Behaviors, 39*, 1081–1086. https://doi.org/10.1016/j.addbeh.2014.03.002

Javanbakht, A., King, A. P., Evans, G. W., Swain, J. E., Angstadt, M., Phan, K. L., & Liberzon, I. (2015). Childhood poverty predicts adult amygdala and frontal activity and connectivity in response to emotional faces. *Frontiers in Psychology, 9*, 154. https://doi.org/10.3389/fnbeh.2015.00154

Kendler, K., Patrick, C., Larsson, H., Gardner, C., & Lichtenstein, P. (2013). Genetic and environmental risk factors in males for self-report externalizing traits in mid-adolescence and criminal behavior through young adulthood. *Psychological Medicine, 43*, 2161–2168. doi:10.1017/S003329171300007X

Kennedy, C. H., Kupke, T., & Smith, R. (2000). A neuropsychological investigation of the Armed Services Vocational Aptitude Battery (ASVAB). *Archives of Clinical Neuropsychology, 15*, 696–697.

Kessler, R. C., Adler, L., Barkley, R., Biederman, J., Conners, C. K., Demler, O., Faraone, S. V., Greenhil, L. L., Howes, M. J., Secnik, K., Spencer, T., Ustun, T. B., Walters, E. E., & Saslavsky, A. M. (2006). The prevalence and correlates of adult ADHD in the United States: Results from the National Comorbidity Survey Replication. *American Journal of Psychiatry, 163*(4), 716–723. https://doi.org/10.1176/appi.ajp.163.4.716

Kessler, R. C., Berglund, P., Demler, O., Jin, R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62,* 593–602.

Kessler, R. C., Davis, C. G., & Kendler, K. S. (1997). Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychological Medicine, 27*, 1101–1119.

Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*, 1048–1060.

Khoury, L., Tang, Y. L., Bradley, B., Cubells, J. F., & Ressler, K. J. (2010). Substance use, childhood traumatic experience, and posttraumatic stress disorder in an urban civilian population. *Depression and Anxiety, 27*, 1077–1086.

Knapik, J. J., Jones, B. H., Hauret, K., Darakjy, S., & Piskator, E. (2004). *A review of the literature on attrition from the military services: Risk factors for attrition and strategies to reduce attrition* (USACHPPM Report No. 12-HF-01Q3A-04). U.S. Army Center for Health Promotion and Preventive Medicine. https://apps.dtic.mil/sti/pdfs/ADA427744.pdf

Lane, S. E., Young, S. Y. N., Bayer, L., Hogan, B., Hyams, K. C., & Ryan, M. A. K. (2002). *Recruit Assessment Program: Implementation at Marine Corps Recruit Depot, San Diego* (NHRC Report No. 02-17). Naval Health Research Center. https://apps.dtic.mil/sti/pdfs/ADA418976.pdf

Larson, G. E., Booth-Kewley, S., & Ryan, M. A. K. (2002). Predictors of Navy attrition. II. A demonstration of potential usefulness for screening. *Military Medicine, 167*, 770–776.

Laurence, J. H., Naughton, J., & Harris, D. A. (1996). *Attrition revisited: Identifying the problem and its solutions*. Human Resources Research Organization. https://apps.dtic.mil/sti/pdfs/ADA309172.pdf

LeardMann, C. A., Kelton, M. L., Smith, B., Littman, A. J., Boyko, E. J., Wells, T. S., & Smith, T. C. (2011). Prospectively assessed posttraumatic stress disorder and associated physical activity. *Public Health Reports, 126*, 371–383.

Liberzon, I., Ma, S. T., Okada, G., Ho, S. S., Swain, J. E., & Evans, G. W. (2015). Chronic poverty and recruitment of adult emotion regulatory neurocircuitry. *Social Cognitive and Affective Neuroscience, 10*, 1596–1606. https://doi.org:10.1093/scan/nsv045

Marcus, S. C., Wan, G. J., Zhang, H. F., & Olfson, M. (2008). Injury among stimulant-treated youth with ADHD. *Journal of Attention Disorders, 12*, 64–69.

McBride, J. (1993). Compensatory screening model development. In T. Trent, & J. H. Lawrence (Eds.), *Adaptability screening for the Armed Forces* (pp. 163–214). Office of the Assistant Secretary of Defense (Force Management and Personnel).

McEwen, C. A., & McEwen, B. S. (2017). Social structure, adversity, toxic stress, and intergenerational poverty: An early childhood model. *Annual Reviews of Sociology, 4*, 445–472. https://doi.org/10.101146/annurev-soc-060116-053252

McLaughlin, K. A., Greif Green, J., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2012). Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. *Archives of General Psychiatry, 69*, 1151–1160. https://doi.org/10.1001/archgenpsychiatry.2011.2277

Merrill, L. L., Stander, V. A., Thomsen, C. J., Crouch, J. L., & Milner, J. S. (2004). Childhood exposure to family violence and attrition in the Navy. *Military Medicine, 169*, 465–469.

Merrill, R. M., Lyon, J. L., Baker, R. K., & Gren, L. H. (2009). Attention deficit hyperactivity disorder and increased risk of injury. *Advances in Medical Science, 54*, 20–26.

Niebuhr, D. W., Scott, C. T., Powers, T. E., Li, Y., Han, W., Millikan, A. M., & Krauss, M. R. (2008). Assessment of Recruit Motivation and Strength study: Preaccession physical fitness

assessment predicts early attrition. *Military Medicine, 173*, 555–562. https://doi.org/10.7205/MILMED.173.6.555

Nikulina, V., Wisom, C. S., & Czaja, S. (2011). The role of childhood neglect and childhood poverty in predicting mental health, academic achievement and crime in adulthood. *American Journal of Community Psychology, 48*, 309–321. https://doi.org/10.1007/s10464-010-9385-y

Ohlmeier, M. D., Peters, K., Te Wildt, B. T., Zedler, M., Ziegenbein, M., Wiese, B., Emrich, H. M., & Schneider, U. (2008). Comorbidity of alcohol and substance dependence with attention-deficit/hyperactivity disorder (ADHD). *Alcohol, 43*, 300–304. https://doi.org/10.1093/alcalc/agn014

Orme, D. R., Brehm, W., & Ree, M. J. (2001). Armed Forces Qualification Test as a measure of premorbid intelligence. *Military Psychology, 13*, 187–197. https://doi.org/10.1207/S15327876MP1304_1

Paxton, K. C., Robinson, W. L., Shah, S., & Schoeny, M. E. (2004). Psychological distress for African-American adolescent males: Exposure to community violence and social support as factors. *Child Psychiatry and Human Development, 34*, 281–295. https://doi.org/10.1023/B:CHUD.0000020680.67029.4f

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry, 18*, 189–193.

Phillips, C. J., LeardMann, C. A., Gumbs, G. R., & Smith, B. (2010). Risk factors for posttraumatic stress disorder among deployed US male Marines. *BMC Psychiatry, 10*, 52.

Pluhar, E., McCracken, C., Griffith, K. L., Christino, M. A., Sugimoto, D., & Meehan, W. P., III. (2019). Team sport athletes may be less likely to suffer anxiety or depression than individual sport athletes. *Journal of Sports Science & Medicine, 18*, 490–496.

Poston, W. S., Haddock, K., Talcott, G. W., Klesges, R. C., Lando, H. A., & Peterson, A. (2002). Are overweight and obese airmen at greater risk of discharge from the United States Air Force? *Military Medicine, 167*, 585–588. https://doi.org/10.1093/milmed/167.7.585

Raglin, J. S. (1990). Exercise and mental health: Beneficial and detrimental effects. *Sports Medicine, 9*, 323–329.

Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychology Bulletin, 128*, 330–366.

Reynolds, K. L., Heckel, H. A., Witt, C. E., Martin, J. W., Pollard, J. A., Knapik, J. J., & Jones, B. H. (1993). Cigarette smoking, physical fitness, and injuries in infantry soldiers. *American Journal of Preventive Medicine, 10*, 145–150. https://doi.org/10.1016/S0749-3797(18)30610-X

Rowe, R., Maughan, B., & Goodman, R. (2004). Childhood psychiatric disorder and unintentional injury: Findings from a national cohort study. *Journal of Pediatric Psychology, 29*, 119–130. https://doi.org/10.1093/jpepsy/jsh015

Sampson, R. J., & Laub, J. H. (1994). Urban poverty and the family context of delinquency: A new look at structure and process in a classic study. *Child Development, 65*, 523–540.

Sandberg, S., McGuiness, D., Hillary, C., & Rutter, M. (1998). Independence of childhood life events and chronic adversities: A comparison of two patient groups and controls. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*, 728–735.

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption--II. *Addiction, 88*, 791–804. https://doi.org/10.1111/j.1360-0443.1993.tb02093.x

Smikle, C. B., Fiedler, E., Sorem, K. A., Spencer, D. K., & Satin, A. J. (1996). The impact of sexual abuse on job attrition in military recruits. *Military Medicine, 3*, 146–148.

Stander, V. A., Reed, C., Olson, C. B., Johnson, J., Merrill, L. L., Clapp, J., Elder, J., Lawson, G., Mangual, G., Lowe, N., Veneziano, J., & Carreon, J. (2003). *Marine Corps drug prevention review* (Report No. 03-06). Naval Health Research Center. https://apps.dtic.mil/sti/pdfs/ADA433293.pdf

Swanson, J. W. (1994). Mental disorder, substance abuse, and community violence: An epidemiological approach. In J. Monahan & H. J. Steadman (Eds), *Violence and mental disorder: developments in risk assessment* (pp. 101–136). University of Chicago Press.

Talcott, G. W., Talcott, G. W., Haddock, C. K., Klesges, R. C., Lando, H., & Fiedler, E. (1999). Prevalence and predictors of discharge in United States Air Force Basic Military Training. *Military Medicine, 164*, 269–274. https://doi.org/10.1093/milmed/164.4.269

Taylor, S. E. (2010). Mechanisms linking early life stress to adverse health outcomes. *PNAS, 107*, 8507–8512. www.pnas.org/cgi/doi/10.1073/pnas.1003890107

Taylor, S. E., Eisenberger, N. I., Saxbe, D., Lehman, B. J., & Lieberman, M. D. (2006). Neural responses to emotional stimuli are associated with childhood family stress. *Biological Psychiatry, 60*, 296–301.

U.S. Department of Defense. (30 March 2018). *Medical standards for appointment, enlistment, or induction into the military services* (DoDI 6130.03-V1). https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/613003v1p.PDF?ver=7cPFjXiGqfqNSF2HHw-X6w%3D%3D

Ware J. E, Jr., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care, 30*, 473–483.

Weiss, M., & Murray, C. (2003). Assessment and management of attention-deficit hyperactivity disorder in adults. *Canadian Medical Association Journal, 168*, 715–722.

White, M. R., Phillips, C. J., Vyas, K. J., & Bauer, L. (2016). Demographic and psychological predictors of early attrition for drug use in the U.S. Marines. *Military Medicine, 181*, 102–107.

Williams, R. A., Hagerty, B. M., Yousha, S. M., Horrocks, J., Hoyle, K. S., & Liu, D. (2004). Psychosocial effects of the boot strap intervention in Navy recruits. *Military Medicine, 169*, 814–820.

Wolfe, J., Turner, K., Caulfield, M., Newton, T. L., Melia, K., Martin, J., & Goldstein, J. (2005). Gender and trauma as predictors of military attrition: A study of Marine Corps recruits. *Military Medicine, 170*, 1037–1043.

Wood, D., Halfon, N., Scarlata, D., Newacheck, P., & Nessim, S. (1993). Impact of family relocation on children's growth, development, school function, and behavior. *JAMA, 270*, 1334–1338.

Wu, N. S., Schairer, L. C., Dellor, E., & Grella, C. (2010). Childhood trauma and health outcomes in adults with comorbid substance abuse and mental health disorders. *Addictive Behaviors, 35*, 68–71.

Young, S. Y., Leard, C. A., Cervak, M. C., Hauret, K. G., Spooner, C., & Ryan, M. A. (2006). *The Recruit Assessment Program (RAP) Experience with Adverse Childhood Experiences (ACE) Questions.* (Report No. 06-04). Naval Health Research Center. https://apps.dtic.mil/sti/pdfs/ADA450579.pdf

Table 1. Relationship Between RAP Factors and Militarily Relevant Personnel Outcomes

Factors	Personnel Outcomes					
	Attrition 4 Months	**Attrition 12 Months**	**Attrition 48 Months**	**Drug Dx**	**Deployment**	**Reenlistment**
Descriptive Factors						
Accession age	+	+	+	+	+	+
HS graduate	+	+	+	++	−	+
BMI	+	++	+	−	+	++
AFQT	+	+	++	+	+	+
Prosocial Factors						
Close friends	−	−	−	+	+	−
Exercise	+	+	+	−	−	+
Team sports	+	+	+	+	+	+
Childhood Adversity						
Household instability	−	−	+	+	+	+
Parental separation	+	+	+	+	+	+
Poverty	+	+	+	+	+	+
ACE score	−	−	−	+	+	+
Trauma	++	++	++	+	++	++
Psychological and Behavioral Issues						
Mental health	++	++	+	+	+	+
ADHD	+	+	+	−	+	+
Problematic Conduct	++	+	+	++	−	++
Problems at home	+	+	+	−	+	+
Substance Use						
AUDIT	+*	+*	+*	++	+	+
Smokeless tobacco	+*	+*	−	+	−	−
Smoking tobacco	+	+	+	++	++	++

+ and ++ indicate a significant relationship between one or more levels of the factor and the outcome.

+ indicates an odds ratio (OR) ≤ .66 or OR ≤ 1.49.

++ indicates an OR < .65 or OR > 1.50.

− indicates that the relationship was not significant.

* indicates that the predictor was protective for the outcome but associated with increased odds for at least one other outcome.

RAP, Recruit Assessment Program; Dx, diagnosis; HS, high school; BMI, body mass index; AFQT, Armed Forces Qualification Test; ACE, Adverse Childhood Experiences; Trauma, exposure to potentially traumatic events; ADHD, attention-deficit/hyperactivity disorder; AUDIT, Alcohol Use Disorders Identification Test.

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Commanding Officer
Naval Health Research Center
140 Sylvester Rd
San Diego, CA 92106-3521

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Commanding Officer
Naval Medical Research Center
503 Robert Grant Ave
Silver Spring, MD 20910-7500

Chief, Bureau of Medicine and Surgery
(MED 00), Navy Dept
7700 Arlington Blvd
Falls Church, VA 22042-5113

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14. ABSTRACT

Introduction: Many factors could be predictive of problems with successful military service, some of which are characteristics of the recruits when they access to service. Despite efforts to provide exemplary military leadership and training, some recruits will be unsuccessful in military service and attrite, or develop drug use disorder, or fail to deploy, or receive an unfavorable reenlistment indicator. Although recruiting efforts have been focused on intelligence and education of incoming recruits, there may be other factors that are equally important in determining whether or not recruits will be successful during military service.
Method: Data from approximately 100,000 Marines collected from 2003 to 2013 using the Recruit Assessment Program (RAP) survey were analyzed in this case-control study. Predictors included Descriptive Factors, Prosocial Factors, Childhood Adversity, Psychological and Behavioral Issues, and Substance Use. Six personnel outcomes were included: attrition from military service before 4, 12, and 48 months of service, drug use disorder diagnoses, deployment status, and the favorability of the reenlistment indicator, which establishes reenlistment eligibility. The relationship of predictors to personnel outcomes was determined in a series of six logistic regressions.
Results: Most of the predictors were related to personnel outcomes (83%). All classes of predictor variables were related to personnel outcomes for at least one level of one predictor. Some Descriptive Factors enhanced the odds of successful military service (education and intelligence), while others decreased the odds (older age at accession, and body mass index outside the normal range). Prosocial Factors were associated with increased odds of successful service. Childhood Adversity and Psychological and Behavioral Issues were associated with decreased odds of successful military service. Substance Use had a mixed pattern for higher scores on the Alcohol Use Disorders Identification Test (AUDIT) and use of smokeless tobacco—both were protective against attrition but associated with increased odds of drug use disorder. Additionally, higher scores on the AUDIT were associated with failure to deploy and with receiving an unfavorable reenlistment indicator. Use of smoking tobacco was consistently related to negative personnel outcomes.
Discussion: Data collected by the RAP survey program are predictive of militarily relevant personnel outcomes. Knowledge of the characteristics of Marines who are vulnerable to unsuccessful military service may allow their support to increase their chances of success during military service. These data may facilitate evidence-based management of incoming recruits.

15. SUBJECT TERMS

Military attrition, drug use disorder, deployment, reenlistment indicator, team sports, childhood adversity delinquency, substance use

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