THE ARMY STUDY TO ASSESS RISK AND RESILIENCE IN SERVICEMEMBERS

(Army STARRS)

&

THE STUDY TO ASSESS RISK AND RESILIENCE IN SERVICEMEMBERS – LONGITUDINAL STUDY

(STARRS-LS)

2009 – 2025

Robert J. Ursano, M.D. (Uniformed Services University) Co-Principal Investigator
Murray B. Stein, M.D., M.P.H. (University of California, San Diego) Co-Principal Investigator
Ronald C. Kessler, Ph.D. (Harvard Medical School) Site Principal Investigator
James Wagner, Ph.D. (University of Michigan) Site Principal Investigator

This document is an ongoing continuous summary of Army STARRS and STARRS-LS publications

CSTS Uniformed Services University
Center for the Study of Traumatic Stress
Department of Psychiatry
Uniformed Services University
4301 Jones Bridge Road, Bethesda, MD 20814-4799
www.CSTSonline.org

TABLE OF CONTENTS:

INTRODUCTION:

Army STARRS (2009-2015) was the largest and most comprehensive research project of mental health ever conducted in the U.S. Army. The project was designed to examine a broad range of risk and resilience (protective) factors across a complex set of outcomes. The Army STARRS research team created a series of extensive databases with the potential to achieve groundbreaking results. These databases allow scientists to investigate a diverse combination of factors including demographic, psychological, biological, neurological, behavioral, and social domains to help identify risk and resilience factors for Soldier suicidal behaviors and associated mental health issues. The project was designed using an adaptive approach which means it evolved as new information became available over the course of the project. With the goal of generating actionable findings, the research team shared preliminary findings with the Army as they become available so that the Army could apply them to its ongoing health promotion, risk reduction, and suicide prevention efforts.

The Army STARRS research project included the following component studies:

1) the Historical Administrative Data Study (HADS) of Army and Department of Defense (DoD) administrative data systems (including records of suicidal behaviors) for all Soldiers on active duty from 2004 to 2009 aimed at finding administrative record predictors of suicides and suicide-related behaviors;
2) two retrospective case-control studies of nonfatal (Soldier Health Outcomes Study A) and fatal (Soldier Health Outcomes Study B) suicidal behaviors;
3) a study of new Soldiers (New Soldier Study) assessed just before beginning basic combat training (BCT) with self-administered questionnaires (SAQ), neurocognitive tests, and blood samples;
4) a cross-sectional study of Soldiers (All Army Study) representative of all other active duty Soldiers (exclusive of BCT);
5) a longitudinal study (Pre-Post Deployment Study) of Soldiers in Brigade Combat Teams assessed (including blood samples) shortly before deployment to Afghanistan, and re-assessed approximately one, three and nine months after returning from deployment.

Soldier Sample Size of Army STARRS Component Studies:

Historical Administrative Data Study (HADS)	>1.6 million
Soldier Health Outcomes Study A (SHOS-A)	186 cases and 375 controls
Soldier Health Outcomes Study B (SHOS-B)	150 cases and 270 controls
New Soldier Study (NSS)	55,814
All Army Study (AAS)	41,210
Pre-Post Deployment Study (PPDS)	10,116

In addition, Army/DoD administrative data were linked prospectively to the large-scale survey data to examine predictors of subsequent suicidality and related mental health outcomes.

STARRS-LS (2015-2025) involves the continuation, extension and expansion of the Army STARRS research to discover additional findings for the Army and the DoD. Under STARRS-LS, the Historical Administrative Data Study (HADS) cohort is being expanded and extended through 2021 to include more than three million Soldiers who were on active duty from 2004 to 2021. STARRS-LS also includes following a cohort of approximately 72 thousand Army STARRS participants from the All Army Study (AAS), New Soldier Study (NSS) and Pre-Post Deployment Study (PPDS) by continuing to link their survey data to Army/DoD administrative data and National Death Index (NDI) data through 2021. STARRS-LS also involves following a cohort of nearly 15 thousand Soldiers subsampled from the 72 thousand Soldier cohort. These nearly 15 thousand Soldiers are being followed through a multi-wave longitudinal study involving additional data collection by administering a series of five surveys (one survey approximately every two years) and by linking the survey data to Army/DoD administrative data and National Death Index (NDI) data through 2021.

STARRS-LS is expected to continue beyond 2025 so the research team can continue to assist the Army, the DoD and the nation. Beyond 2025 the research team will further expand the Historical Administrative Data Study (HADS) beyond 2021, continue to follow the 72 thousand Army STARRS participants using their Army/DoD administrative data and NDI data, continue to design and administer periodic follow-up surveys approximately every two years to the nearly 15 thousand STARRS-LS participants, and continue to link the STARRS-LS survey data to the Army/DoD administrative data and NDI data beyond 2021. In addition, the research team will continue to work with the Army and the DoD to adapt the research design and objectives to best meet the current and future needs of the Army and DoD.

PUBLICATIONS AND FINDINGS:

The following is a brief summary of published findings to-date from Army STARRS and STARRS-LS. Findings followed by an asterisk (*) were included in USU press releases.

1. **The Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Ursano, et al 2014)**

   - Component study cooperation rates are comparatively high.
   - Sample biases are relatively small.
   - Inefficiencies introduced into parameter estimates by using nonresponse adjustment weights and time-space clustering are small.
   - Initial findings show that the suicide death rate, which rose over 2004–2009, increased for those deployed, those never deployed, and those previously deployed.
   - Analyses of administrative records show that those deployed or previously deployed were at greater suicide risk.
   - Receiving a waiver to enter the Army was not associated with increased risk.
   - Being demoted in the past two years was associated with increased risk.
   - Time in current deployment, length of time since return from most recent deployment, total number of deployments, and time interval between most recent deployments (known as dwell time) were not associated with suicide risk.
   - Initial analyses of survey data show that 13.9% of currently active non-deployed regular Army Soldiers considered suicide at some point in their lifetime, while 5.3% had made a suicide plan, and 2.4% had attempted suicide.*
   - 47–60% of these outcomes first occurred prior to enlistment.*
   - Prior mental disorders (in particular major depression and intermittent explosive disorder) were the strongest predictors of these self-reported suicidal behaviors.
   - Most onsets of plans-attempts among ideators (58.3–63.3%) occurred within the year of onset of ideation.

- About 25.1% of non-deployed U.S. Army personnel met 30-day criteria for a DSM-IV anxiety, mood, disruptive behavior, or substance disorder (15.0% an internalizing disorder; 18.4% an externalizing disorder) and 11.1% for multiple disorders.*

- Three-fourths of these disorders had pre-enlistment onsets.*

- Integration across component studies creates strengths going well beyond those in conventional applications of the same individual study designs.

- These design features create a strong methodological foundation from which Army STARRS can pursue its substantive research goals.

- The early findings reported here illustrate the importance of the study and its approach as a model of studying rare events particularly of national security concern.

- Continuing analyses of the data will inform suicide prevention for the U.S. Army.

2. **Sociodemographic and Career History Predictors of Suicide Mortality in the United States Army 2004–2009 (Gilman, et al 2014)**

    - Several novel results were found that could have intervention implications.

    - Significantly elevated suicide rates among enlisted Soldiers deployed either during their first year of service or with less than expected (based on time in service) junior enlisted rank (69.6–80.0 suicides per 100,000 person-years compared with 18.5 suicides per 100,000 person-years in the total Army)

    - Substantially greater rise in suicide among women than men during deployment

    - Protective effect of marriage against suicide only during deployment.

    - Career history approach produces several actionable insights missed in less textured analyses of administrative data predictors.

    - Expansion of analyses to a richer set of predictors might help refine understanding of intervention implications.

3. **Predictors of Suicide and Accident Death in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Schoenbaum, et al, 2014)**

    - The suicide rate rose between 2004 and 2009 among never deployed and currently and previously deployed Regular Army Soldiers.

- The accident death rate fell sharply among currently deployed Soldiers, remained constant among the previously deployed, and trended upward among the never deployed.

- Increased suicide risk was associated with being a man (or a woman during deployment), white race/ethnicity, junior enlisted rank, recent demotion, and current or previous deployment.

- Sociodemographic and Army experience predictors were generally similar for suicides and accident deaths.

- Time trends in these predictors and in the Army's increased use of accession waivers (which relaxed some qualifications for new Soldiers) do not explain the rise in Army suicides.

- Predictors of Army suicides were largely similar to those reported elsewhere for civilians, although some predictors distinct to Army service emerged that deserve more in-depth analysis.

- The existence of a time trend in suicide risk among never-deployed Soldiers argues indirectly against the view that exposure to combat-related trauma is the exclusive cause of the increase in Army suicides.

4. **Thirty-Day Prevalence of DSM-IV Mental Disorders among Nondeployed Soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Kessler, et al 2014)**

    - A total of 25.1% of respondents met criteria for any 30-day disorder (15.0% internalizing; 18.4% externalizing) and 11.1% for multiple disorders.

    - A total of 76.6% of cases reported pre-enlistment age at onset of at least one 30-day disorder (49.6% internalizing; 81.7% externalizing).*

    - 12.8% of respondents reported severe role impairment.

    - Controlling for sociodemographic and Army career correlates (which were broadly consistent with other studies) 30-day disorders with pre-enlistment and post-enlistment ages at onset both significantly predicted severe role impairment

    - Pre-enlistment disorders were more consistent powerful predictors than post-enlistment disorders.

    - Population-attributable risk proportions of severe role impairment were 21.7% for pre-enlistment disorders, 24.3% for post-enlistment disorders, and 43.4% for all disorders.

- Interventions to limit accession or increase resilience of new Soldiers with pre-enlistment mental disorders might reduce prevalence and impairments of mental disorders in the U.S. Army.

5. **Prevalence and Correlates of Suicidal Behavior among Soldiers: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Nock, et al 2014)**

    - The lifetime prevalence estimates of suicidal ideation, suicide plans, and suicide attempts are 13.9%, 5.3%, and 2.4%.*

    - Most reported cases (47.0%-58.2%) had pre-enlistment onsets.*

    - Pre-enlistment onset rates were lower than in a prior national civilian survey (with imputed/simulated age at enlistment).

    - Post-enlistment onsets of ideation and plans were higher, and post-enlistment first attempts were equivalent to civilian rates.

    - Most reported onsets of plans and attempts among ideators (58.3%-63.3%) occur within the year of onset of ideation.

    - Post-enlistment attempts are positively related to being a woman, lower rank, and previously deployed, and are negatively related to being unmarried and assigned to Special Operations Command.

    - Five mental disorders predict post-enlistment first suicide attempts in multivariate analysis:

        - pre-enlistment panic disorder
        - pre-enlistment posttraumatic stress disorder
        - post-enlistment depression
        - pre-enlistment intermittent explosive disorder
        - post-enlistment intermittent explosive disorder

    - 4 of these 5 (posttraumatic stress disorder is the exception) predict ideation.

    - Only post-enlistment intermittent explosive disorder predicts attempts among ideators.

    - Population-attributable risk proportions of lifetime mental disorders predicting post-enlistment suicide attempts are:

        - 31.3% for pre-enlistment onset disorders
        - 41.2% for post-enlistment onset disorders
        - 59.9% for all disorders

- The fact that approximately one-third of post-enlistment suicide attempts are associated with pre-enlistment mental disorders suggests that pre-enlistment mental disorders might be targets for early screening and intervention.

- The possibility of higher fatality rates among Army suicide attempts than among civilian suicide attempts highlights the potential importance of means control (i.e., restricting access to lethal means [such as firearms]) as a suicide prevention strategy.

6. **Risk Factors for Accident Death in the U.S. Army, 2004-2009 (Lewandowski-Romps, et al 2014)**

    - Delayed rank progression or demotion and being male, unmarried, in a combat arms specialty, and of low rank/service length increased odds of accident death for enlisted Soldiers.

    - Unique to officers was high risk associated with aviation specialties.

    - Accident death risk decreased over time for currently deployed, enlisted Soldiers and increased for those never deployed.

    - Mental health diagnosis was associated with risk only for previous and never-deployed, enlisted Soldiers.

    - Models did not discriminate not-line-of-duty from line-of-duty accident deaths.

    - Adding more refined person-level and situational risk indicators to current models could enhance understanding of accident death risk specific to Soldier rank and deployment status.

    - Stable predictors could help identify high risk of accident deaths in future cohorts of Regular Army Soldiers.

7. **Predicting Suicides after Psychiatric Hospitalization in U.S. Army Soldiers: The Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Kessler, et al 2015)**

    - Sixty-eight Soldiers died by suicide within 12 months of hospital discharge (12.0% of all U.S. Army suicides), equivalent to 263.9 suicides per 100,000 person-years compared with 18.5 suicides per 100,000 person-years in the total U.S. Army.

- The strongest predictors included sociodemographics:
    - male sex
    - late age of enlistment
    - criminal offenses (verbal violence and weapons possession)
    - prior suicidality
    - aspects of prior psychiatric inpatient and outpatient treatment (e.g., number of antidepressant prescriptions filled in the past 12 months), and disorders diagnosed during the focal hospitalizations (e.g., non-affective psychosis)

- A total of 52.9% of post-hospitalization suicides occurred after the 5% of hospitalizations with highest predicted suicide risk (3,824.1 suicides per 100,000 person-years).*

- These highest-risk hospitalizations also accounted for significantly elevated proportions of several other adverse post-hospitalization outcomes (unintentional injury deaths, suicide attempts, and subsequent hospitalizations).*

- The high concentration of risk of suicide and other adverse outcomes might justify targeting expanded post-hospitalization interventions to Soldiers classified as having highest post-hospitalization suicide risk, although final determination requires careful consideration of intervention costs, comparative effectiveness, and possible adverse effects.

8. **Lifetime Prevalence of DSM-IV Mental Disorders among New Soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Rosellini, et al 2015)**

    - Lifetime prevalence of having at least one internalizing, externalizing, or either type of disorder did not differ significantly between new Soldiers and civilians

    - Three specific disorders (generalized anxiety, posttraumatic stress, and conduct disorders) and multi-morbidity were significantly more common among new Soldiers than civilians.

    - Several socio-demographic characteristics were significantly associated with disorder prevalence and persistence (these associations were uniformly weak).

    - New Soldiers differ somewhat, but not consistently, from civilians.

9. **Prevalence and Correlates of Suicidal Behavior among New Soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Ursano, et al 2015)**

   - Lifetime prevalence estimates of pre-enlistment suicide ideation, plans, and attempts were 14.1, 2.3, and 1.9%, respectively.

   - Most reported onsets of suicide plans and attempts (73.3–81.5%) occurred within the first year after onset of ideation.

   - Odds of these lifetime suicidal behaviors among new Soldiers were positively, but weakly associated with being female, unmarried, religion other than Protestant or Catholic, and a race/ethnicity other than non-Hispanic White, non-Hispanic Black, or Hispanic.

   - Lifetime prevalence estimates of suicidal behaviors among new Soldiers are consistent with retrospective reports of pre-enlistment prevalence obtained from Soldiers later in their Army careers.

   - Given that prior suicidal behaviors are among the strongest predictors of later suicides, consideration should be given to developing methods of obtaining valid reports of pre-enlistment suicidality from new Soldiers to facilitate targeting of preventive interventions.

10. **Mental Disorders, Comorbidity, and Pre-enlistment Suicidal Behavior Among New Soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Nock, et al 2015)**

    - Most new Soldiers with a pre-enlistment history of suicide attempt reported a prior mental disorder (59.0%).

    - Each disorder examined was associated with increased odds of suicidal behavior.

    - Only PTSD and disorders characterized by irritability and impulsive/aggressive behavior (i.e., bipolar disorder, conduct disorder, oppositional defiant disorder, and attention-deficit/hyperactivity disorder) predicted unplanned attempts among ideators.

    - Mental disorders are important predictors of pre-enlistment suicidal behavior among new Soldiers and should figure prominently in suicide screening and prevention efforts.

11. Understanding the Elevated Suicide Risk of Female Soldiers during Deployments (Street, et al 2015)

- The suicide rate of currently deployed women (14.0/100,000 person-years) was 3.1 to 3.5 times the rates of other (i.e., never-deployed/previously deployed) women.
- The suicide rate of currently deployed men (22.6/100,000 person years) was 0.9 to 1.2 times the rates of other men.
- The adjusted (for time trends, sociodemographics, and Army career variables) female to male odds ratio comparing the suicide rates of currently deployed vs. other women vs. men was 2.8 (95% confidence interval 1.1–6.8), became 2.4 after excluding Soldiers with Direct Combat Arms occupations, and remained elevated (in the range 1.9–2.8) after adjusting for the hypothesized explanatory variables.
- None of the explanatory variables considered could fully account for the disproportionately elevated female suicide rate during deployment among Regular Army enlisted Soldiers over the years 2004–2009.
- These results are valuable in excluding otherwise plausible hypotheses for the elevated suicide rate of deployed women and point to the importance of expanding future research on the psychological challenges of deployment for women.

12. Nonfatal Suicidal Behaviors in U.S. Army Administrative Records, 2004-2009: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Ursano, et al 2015)

- U.S. Army suicide rate is known to have risen sharply over the past decade, but information about medically documented, non-fatal suicidal behaviors (suicide attempts, suspicious injuries, and suicide ideation) is far more limited.
- There were 21,740 unique Regular Army Soldiers with a non-fatal suicidal event at some point during 2004-2009.
- There were substantial increases in the annual incidence rates of suicide attempts (179–400/100,000 person-years) and suicide ideation (557–830/100,000 person-years), but not suspicious injuries.
- Using hierarchical classification rules to identify the first instance of each Soldier's most severe behavior, there was an increased risk of all outcomes among those who were female, Non-Hispanic White, never married, lower-ranking enlisted, less educated, and of younger age when entering Army service.

- Socio-demographic associations significantly differed across outcomes, despite some patterns that appear similar.

13. Suicide Attempts in the U.S. Army during the Wars in Afghanistan and Iraq, 2004-2009 (Ursano, et al 2015)

- The study included 9,791 medically documented suicide attempts among Regular Army Soldiers during the period 2004 to 2009. Predictor variables were constructed from Army personnel and medical records.

- Enlisted Soldiers accounted for 98.6% of all suicide attempts, with an overall rate of 377/100,000 person-years, versus 27.9/100,000 person-years for officers.*

- Significant predictors among enlisted Soldiers included socio-demographic characteristics (female gender, older age at Army entry, younger current age, lower education, non-Hispanic white), short length of service, never or previously deployed, and the presence and recency of mental health diagnoses. Risk was highest early in the Army career.*

- Among officers, only socio-demographic characteristics (female gender, older age at Army entry, younger current age, and low education) and the presence and recency of mental health diagnoses were significant.*

- The results represent the most comprehensive accounting of U.S. Army suicide attempts to date and reveal unique risk profiles for enlisted Soldiers and officers, and highlight the importance of focusing research and prevention efforts on enlisted Soldiers in their first tour of duty.*

14. Occupational Differences in U.S. Army Suicide Rates (Kessler, et al 2015)

- Military research has found elevated suicide rates in combat arms occupations, but has not evaluated variation in this pattern by deployment history which is the indicator of occupational stress widely considered responsible for the recent rise in military suicide rates.

- This study analyzed associations of Army occupation and deployment history in predicting suicide among 729,337 male enlisted Regular Army Soldiers in 2004-2009.

- There were 496 suicides (22.4/100,000 person-years) during the study period and only two occupational categories (both in combat arms) had significantly elevated suicide rates: infantrymen (37.2/100,000 person-years) and combat engineers (38.2/100,000 person-years).

- Suicide rates in these two occupational categories were significantly lower when currently deployed (30.6/100,000 person-years) than never deployed or previously deployed (41.2-39.1/100,000 person years).

- The suicide rate of other Soldiers was significantly higher when currently deployed and previously deployed (20.2-22.4/100,000 person-years) than never deployed (14.5/100,000 person-years).

- Adjusted suicide rate for infantrymen and combat engineers was most elevated when never deployed (OR=2.9, 95% CI=2.1-4.1), less so when previously deployed (OR=1.6, 95% CI=1.1-2.1) and not at all when currently deployed (OR=1.2, 95% CI=0.8-1.8).

- Adjustment for a differential "healthy warrior effect" cannot explain this variation in the relative suicide rates of never deployed infantrymen and combat engineers by deployment status.

15. Prospective Longitudinal Evaluation of the Effect of Deployment-Acquired Traumatic Brain Injury on Posttraumatic Stress and Related Disorders: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Stein, et al 2015)

- Approximately one in five Soldiers reported exposure to TBI during the index deployment (mild TBI 18.0% and more-than-mild TBI 1.2%).

- Even after adjusting for other risk factors (e.g., pre-deployment mental health status, severity of deployment stress, prior TBI history), deployment-acquired TBI was associated with elevated adjusted odds of PTSD, generalized anxiety disorder, and major depressive episode.

16. Predicting Non-Familial Major Physical Violent Crime Perpetration in the U.S. Army from Administrative Data (Rosellini, et al 2015)

- A machine learning model was developed aimed at predicting which Soldiers would subsequently commit a severe, physical violent crime.

- Model was based on an analysis of administrative data for all 975,057 Regular Army Soldiers on active duty from 2004 to 2009. Hundreds of potential predictors were examined from the extensive administrative records available.

- 5,771 of these Soldiers committed a first founded major physical violent crime (murder-manslaughter, kidnapping, aggravated arson, aggravated assault, robbery) over that time period.

- The 5% of Soldiers classified by the model as having highest predicted risk accounted for 36.2% of all major physical violent crimes committed by men, and 33.1% by women, over the six years of study.

- When the model was applied to a more recent cohort in 2011-2013 (a validation sample), the 5% of Soldiers with highest predicted risk accounted for 50.5% of all major physical violent crimes.

- Key predictors were indicators of disadvantaged social/socio-economic status, early career stage, prior crime, and mental disorder treatment. Area under the receiver operating characteristic curve was .80-.82 in 2004-2009 and .77 in 2011-2013.

- Although these results suggest that the model could be used to target Soldiers at high risk of violent crime perpetration for preventive interventions, final implementation decisions would require further validation and weighing of predicted effectiveness against intervention costs and competing risks.

17. Mental Health Treatment among Soldiers with Current Mental Disorders in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Colpe, et al 2015)

- This analysis included a representative sample of 5,428 non-deployed Regular Army Soldiers who completed a self-administered questionnaire (SAQ) and consented to linking SAQ data with administrative records.

- The SAQ included information about prevalence and treatment of mental disorders among respondents with current Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) internalizing (anxiety, mood) and externalizing (disruptive behavior, substance) disorders.

- 21.3% of Soldiers with any current disorder reported current treatment.

- Seven significant predictors of being in treatment were identified.

    - Four were indicators of psychopathology (bipolar disorder, panic disorder, post-traumatic stress disorder, 8 or more months duration of disorder).

    - Two were sociodemographics (history of marriage, not being non-Hispanic Black).

    - The final predictor was history of deployment.

- Treatment rates varied between 4.7 and 71.5% depending on how many positive predictors the Soldier had. The vast majority of Soldiers had a low number of these predictors.

- These results document that most non-deployed Soldiers with mental disorders are not in treatment and that untreated Soldiers are not concentrated in a particular segment of the population that might be targeted for special outreach efforts. Analysis of modifiable barriers to treatment is needed to help strengthen outreach efforts.

18. Prognostic Indicators of Persistent Post-Concussive Symptoms after Deployment-Related Mild Traumatic Brain Injury: A Prospective Longitudinal study in U.S. Army Soldiers (Stein, et al 2016)

- Persistent and severe post-concussive symptoms (PCS) were found among Soldiers who experienced a mild TBI while deployed to Afghanistan.

- The study sample consisted of 4,518 Soldiers from three Brigade Combat Teams who deployed an average of 10 months to Afghanistan in 2012. Of these Soldiers, 822 experienced a mild TBI during the deployment.

- Based on surveys administered 1, 3, and 9 months following redeployment, the Soldiers with mild TBI were three times more likely to report PCS than other Soldiers in the BCTs.

- More severe symptoms were reported by Soldiers with a history of TBI(s) or mental health problems (depression, anxiety, irritability, etc.) prior to this deployment, or more severe deployment-related stress.

- Persistent and more severe symptoms were also more likely when there was loss of consciousness or memory problems associated with the TBI (versus being "dazed" only).

- Female Soldiers were more likely than male Soldiers to experience poor recovery following mild TBI.

19. Genome-Wide Association Studies of Posttraumatic Stress Disorder in 2 Cohorts of U.S. Army Soldiers (Stein, et al 2016)

- The analysis was designed to discover genetic loci associated with lifetime PTSD risk in the U.S. Army. Two coordinated genome-wide association studies (GWAS) of mental health were conducted for nearly 13,700 consenting Soldiers in two cohorts from Army STARRS.*

- These were the largest genome-wide association studies (GWAS) of PTSD to date.*

- GWAS were performed on 3,167 Soldiers with PTSD (cases) and 4,607 trauma-exposed control Soldiers from the New Soldier Study (NSS), and 947 Soldiers with PTSD (cases) and 4,969 trauma-exposed control Soldiers from the Pre/Post Deployment Study (PPDS). The primary analysis compared lifetime DSM-IV PTSD cases to trauma-exposed controls without lifetime PTSD.*

- Two statistically significant genetic variants were found associated with PTSD among Soldiers who were part of the NSS. One variant, in samples from African American Soldiers with PTSD, was in a gene (ANKRD55) on chromosome 5. In prior research, this gene has been found to be associated with various autoimmune and inflammatory disorders, including multiple sclerosis, type 2 diabetes, celiac disease, and rheumatoid arthritis. The other variant was found on chromosome 19 in European American samples.*

- There were no significant genetic correlations observed between PTSD and six mental disorders and nine immune-related disorders. However there was significant evidence of pleiotropy (i.e., genetic factors having effects on multiple traits) for PTSD and rheumatoid arthritis, and to a lesser extent, psoriasis.*

- Further efforts are needed to replicate the genome-wide significant association researchers found with the gene ANKRD55, and to clarify the nature of the genetic overlap observed between PTSD and rheumatoid arthritis and psoriasis.*

20. Risk Factors, Methods, and Timing of Suicide Attempts among U.S. Army Soldiers (Ursano, et al 2016)

- This analysis used Army STARRS historical administrative data for more than 1.6 million Soldiers on active duty from 2004 to 2009. The study identified 9,650 incident suicide attempts among regular Army Soldiers (excluding National Guard and Reserve) during 2004-2009.*

- The 40% of enlisted Soldiers who had never deployed accounted for 61% of enlisted suicide attempters. Regardless of deployment status, suicide attempts were more likely among Soldiers who were female, in their first 2 years of service, or had recently received a mental health diagnosis.*

- Risk among never deployed Soldiers was highest the 2nd month of service. Risk among currently deployed Soldiers on their 1st deployment was highest at the 6th month of deployment. Previously deployed Soldiers were at highest risk at 5 months after return.*

- Drug overdose was the most common method of suicide attempt and accounted for more than 50% of all attempts. Although not overall very frequent, the use of firearms was most likely to occur among currently deployed (21/100,000 person-years) or previously deployed Soldiers (14/100,000 person-years), compared to 5/100,000 person-years among Soldiers who had never deployed.*

- As in other studies, a history of any mental health diagnosis was associated with suicide attempts in all deployment groups. The highest odds occurred in the month following the most recent diagnosis and then decreased over time.*

- Soldiers with depression in the previous month had the highest odds of suicide attempt across the deployment groupings.*

- PTSD and substance use disorder were associated with suicide attempts, but varied by deployment status with the greatest risk among the never deployed Soldiers.

- The odds of a suicide attempt increased with the number of mental health diagnoses a Soldier received. The effect of multiple diagnoses was most pronounced among currently deployed Soldiers.

- Suicide attempt has rarely been studied with data as comprehensive as the data used in this research. The findings highlight the complexity of risk and protective factors in different settings and contexts, and the importance of life and career history in understanding suicide attempts in the U.S. Army.

- A better understanding of suicide attempts may provide opportunities for the prevention of suicidal behavior in the Army as well as in other populations.

21. Predicting Suicides after Outpatient Mental Health Visits in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Kessler, et al 2016)

- Given that clinician-based assessments are not known to be strong predictors of suicide, this study investigated whether a precision medicine model using administrative data after outpatient mental health specialty visits could be developed to predict suicides among outpatients.

- This analysis used Army STARRS historical administrative data for more than 1.6 million Soldiers on active duty from 2004 to 2009 and focused on male non-deployed Regular U.S. Army Soldiers because they account for the vast majority of such suicides.

- The study calculated the observed proportions of suicide deaths within 5 weeks of each ventile (5% grouping) of specialty mental health outpatient visits ranked by predicted suicide risk based on the optimal prediction model out of the population of all such visits made by male non-deployed Regular U.S. Army Soldiers in 2004-2009.

- 41.5% of Army suicides in 2004-2009 occurred among the 12.0% of Soldiers seen as outpatient by mental health specialists, with risk especially high within 26 weeks of visits.

- An elastic net classifier with 10-14 predictors optimized sensitivity (45.6% of suicide deaths occurring after the 15% of visits with highest predicted risk).

- The 5% of visits with highest risk included only 0.1% of Soldiers (1047.1 suicides/100,000 person-years in the 5 weeks after the visit).

- This is a high enough concentration of risk to have implications for targeting preventive interventions. An even better model might be developed in the future by including the enriched information on clinician-evaluated suicide risk mandated by the VA/DoD CPG to be recorded.

22. Cross-Phenotype Polygenic Risk Score Analysis of Persistent Post-Concussive Symptoms in U.S. Army Soldiers with Deployment-Acquired Traumatic Brain Injury (Polimanti, et al 2016)

- This study used a prospective longitudinal survey of three Brigade Combat Teams to assess deployment-acquired TBI and persistent physical, cognitive, and emotional post-concussive symptoms (PCS).

- A cross-phenotype high-resolution polygenic risk score (PRS) analysis of persistent post-concussive symptoms (PCS) was conducted in 845 U.S. Army Soldiers who sustained TBI during deployment.

- PRS was derived from summary statistics of large genome-wide association studies of Alzheimer's disease, Parkinson's disease, schizophrenia, bipolar disorder, and major depressive disorder; and for years of schooling, college completion, childhood intelligence, infant head circumference (IHC), and adult intracranial volume.

- Although the study had more than 95% of statistical power to detect moderate-to-large effect sizes, no association was observed with neurodegenerative and psychiatric disorders, suggesting that persistent PCS does not share genetic components with these traits to a moderate-to-large degree.

- Subjects with high IHC PRS recovered better from cognitive/emotional persistent PCS than the other individuals.

- Enrichment analysis identified two significant Gene Ontology (GO) terms related to this result: GO:0050839~Cell adhesion molecule binding and GO:0050905~Neuromuscular process.

- The study indicated that the genetic predisposition to persistent PCS after TBI does not have substantial overlap with neurodegenerative and psychiatric diseases, but mechanisms related to early brain growth may be involved.

23. An Examination of Potential Misclassification of Army Suicides: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Cox, et al 2016)

- Systematic review of CID investigative files for 510 suicides, and 488 accident, homicide and undetermined deaths from 2005-2009.

- Using research criteria, 35 of 488 (8.2%) of non-suicides were reclassified to "definite, probable, or possible" suicide.

- Only 1 of 488 (0.2%) was reclassified to definite suicide.

- CID investigative practices reflect the "true" population of Army suicides. Flagrant misclassification was uncommon.

24. Barriers to Initiating and Continuing Mental Health Treatment Among Soldiers in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Naifeh, et al 2016)

- Army Soldiers with mental disorders report a variety of barriers to initiating and continuing treatment.

- This study involved a representative sample of 5,428 non-deployed Regular Army Soldiers who completed a self-administered questionnaire and consented to linking their questionnaire data with administrative records.

- The study examined reported treatment barriers (perceived need, structural reasons, attitudinal reasons) among respondents with current Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, mental disorders who either did not seek treatment in the past year (n = 744) or discontinued treatment (n = 145).

- 82.4% of Soldiers who did not initiate treatment, and 69.5% of Soldiers who discontinued treatment, endorsed at least two barriers.

- 69.8% of never-treated Soldiers reported no perceived need.

- Attitudinal reasons were cited more frequently than structural reasons among never-treated Soldiers with perceived need (80.7% vs. 62.7%) and Soldiers who discontinued treatment (71.0% vs. 37.8%).

- Multivariate associations with socio-demographic, Army career, and mental health predictors varied across barrier categories.

- These findings suggest most Soldiers with mental disorders do not believe they need treatment and those who do typically face multiple attitudinal and, to a lesser extent, structural barriers.

- Improved understanding of these treatment barriers can help direct mental health services to Soldiers in need.

25. Developing a Risk Model to Target High-Risk Preventive Interventions for Sexual Assault Victimization Among Female U.S. Army Soldiers (Street, et al 2016)

- Sexual violence victimization is a significant problem among female U.S. military personnel. Preventive interventions for high-risk individuals might reduce prevalence but would require accurate targeting.

- This study attempted to develop a targeting model for female Regular U.S. Army Soldiers based on theoretically guided predictors abstracted from administrative data records.

- Because administrative reports of sexual assault victimization are known to be incomplete, parallel machine learning models were developed to predict administratively recorded (in the population) and self-reported (in a representative survey) victimization. Capture–recapture methods were used to combine predictions across models.

- Key predictors included low status, crime involvement, and treated mental disorders.

- Area under the receiver operating characteristic curve was .83–.88.

- Between 33.7% and 63.2% of victimizations occurred among Soldiers in the highest risk ventile (5%).

- This high concentration of risk suggests that the models could be useful in targeting preventive interventions, although final determination would require careful weighing of intervention costs, effectiveness, and competing risks.

26. Using Administrative Data to Identify U.S. Army Soldiers at High-Risk of Perpetrating Minor Violent Crimes (Rosellini, et al 2016)

- Interventions exist to reduce violent crimes in high-risk populations, but optimal implementation requires evidence-based targeting.
- The goal of this study was to use machine learning methods to develop models to predict minor violent crime perpetration among U.S. Army Soldiers.
- Predictors were abstracted from administrative data available for all 975,057 Soldiers in the U.S. Army from 2004 to 2009. There were 25,966 men and 2,728 women who committed a first founded minor violent crime (simple assault, blackmail-extortion-intimidation, rioting, or harassment).
- Temporally prior administrative records measuring socio-demographic, Army career, criminal justice, medical/pharmacy, and contextual variables were used to build separate male and female prediction models that were then tested in an independent sample of U.S. Army Soldiers from 2011 to 2013.
- Final model predictors included young age, low education, early career stage, prior crime involvement, and outpatient treatment for diverse emotional and substance use problems.
- 30.5–28.9% (men-women) of all administratively-recorded crimes in 2004–2009 were committed by the 5% of Soldiers having highest predicted risk, with similar proportions (28.5–29.0%) when the 2004–2009 coefficients were applied to the 2011–2013 test sample.
- These results suggest that it may be possible to target Soldiers at high-risk of violence perpetration for preventive interventions.
- Final decisions about such interventions would require weighing predicted effectiveness against intervention costs and competing risks.

27. Neurocognitive Function and Suicide in U.S. Army Soldiers (Naifeh, et al 2016)

- This study used administrative data from 2004 to 2009 to examine associations between neurocognitive functioning and subsequent suicidal events among Regular Army enlisted Soldiers.
- Cases were all Soldiers who completed the Army's Automated Neuropsychological Assessment Metrics (ANAM) computerized testing battery prior to documented suicide attempt (n = 607), ideation (n = 955), or death (n = 57). Controls were an equal-probability sample of 9,893 person-months from other Soldiers.

- Exploratory factor analysis of five ANAM tests identified a general neurocognitive factor that excluded the mathematic processing test (MTH). When examined separately in logistic regression analyses that controlled for sociodemographics and prior mental health diagnosis, both the general neurocognitive factor and MTH were associated with all outcomes.

- When both predictors were examined simultaneously, the general neurocognitive factor continued to be associated with all outcomes and MTH continued to be associated with suicide attempt and ideation.

- These small but robust associations suggest that future research must continue to examine the extent to which objective neurocognitive tests may enhance understanding and prediction of suicide risk.

28. Alcohol Misuse and Co-Occurring Mental Disorders Among New Soldiers in the U.S. Army (Stein, et al 2016)

- This study used cross-sectional survey data from Soldiers reporting for basic combat training to retrospectively assess lifetime alcohol consumption and substance abuse/dependence, enabling estimation of the prevalence of lifetime binge drinking and heavy drinking in a sample of 30,583 Soldiers and of probable alcohol use disorder (AUD) among 26,754 Soldiers with no or minimal lifetime use of other drugs.

- Co-occurrence of mental disorders and other adverse outcomes with binge drinking, heavy drinking, and AUD was examined. Discrete-time survival analysis, with person-year the unit of analysis and a logistic link function, was used to estimate associations of AUD with subsequent onset of mental disorders and vice versa.

- Prevalence of lifetime binge drinking was 27.2% among males and 18.9% among females; respective estimates for heavy drinking were 13.9% and 9.4%.

- Among Soldiers with no or minimal drug use, 9.5% of males and 7.2% of females had lifetime AUD.

- Relative to no alcohol misuse, binge drinking, heavy drinking, and AUD were associated with increased odds of all mental disorders and other adverse outcomes under consideration.

- Prior mental disorders and suicidal ideation were associated with onset of AUD, and prior AUD was associated with onset of mental disorders and suicidal ideation.

- Strong bidirectional associations between alcohol misuse and mental disorders were observed. Recognition of alcohol misuse and mental disorders upon enlistment may provide opportunities for risk mitigation early in a Soldier's career.

29. Medically Documented Suicide Ideation Among U.S. Army Soldiers (Ursano, et al 2016)

- This study used administrative data to examine predictors of medically documented suicide ideation (SI) among Regular Army Soldiers from 2006 through 2009. The study included 10,466 ideators and 124,959 control person-months.

- Enlisted ideators (97.8% of all cases) were more likely than controls to be female, younger, older when entering service, less educated, never or previously deployed, and have a recent mental health diagnosis.

- Officer ideators were more likely than controls to be female, younger, younger when entering service, never married, and have a recent mental health diagnosis.

- Risk among enlisted Soldiers peaked in the second month of service then declined steadily, whereas risk among officers remained relatively stable over time.

- Risk of SI is highest among enlisted Soldiers early in Army service, females, and those with a recent mental health diagnosis.

- Most cases of medically documented SI in the U.S. Army occurred among enlisted Soldiers in their first tour of duty.

- Risk was particularly elevated among enlisted Soldiers during the initial months of training, and among Soldiers with a mental health diagnosis recorded during a recent health care encounter.

- Given apparent similarities between our findings on SI and recently published evidence on suicide attempts, it is important for future studies to examine how risk may differ across suicide-related outcomes of increasing severity.

30. Genetic Risk Variants for Social Anxiety (Stein, et al 2017)

- This study used genome-wide association analysis (GWAS) to determine SNP-based heritability of social anxiety, discern genetic risk loci for social anxiety, and determine shared genetic risk with neuroticism and extraversion.

- GWAS were conducted within ancestral groups, European Americans (EUR), African Americans (AFR) and Latin Americans (LAT), using linear regression models for each of the three component studies in Army STARRS, and then meta-analyzed across studies.

- SNP-based heritability for social anxiety was significant in EUR. One meta-analytically genome-wide significant locus was seen in each of the EUR and AFR samples.

- Social anxiety was significantly genetically correlated (negatively) with extraversion but not with neuroticism or with an anxiety disorder factor score from external GWAS meta-analyses.

- This first GWAS of social anxiety confirms a genetic basis for social anxiety, shared with extraversion but possibly less so with neuroticism.

31. Frequency of Improvised Explosive Devices and Suicide Attempts in the U.S. Army (Ursano, et al 2017)

- This study examined the association of monthly IED rates with risk of Soldier suicide attempt among those deployed and non-deployed among all active duty Regular Army suicide attempters 2004-2009 (n = 9,791) and an equal-probability sample of control Soldiers.

- Logistic regression analyses examined Soldiers' risk of attempting suicide as a function of monthly IED frequency, controlling for socio-demographics, service-related characteristics, rate of deployment/redeployment, combat deaths and injuries. The association of IED frequency with suicide attempt was examined overall and by time in service and deployment status.

- Soldiers' risk of suicide attempt increased with increasing numbers of IEDs. Suicide attempt was 26% more likely for each 1,000 IED increase in monthly frequency.

- The association of IED frequency with suicide attempt was greater for Soldiers in their first 2 years of service than for those with 3 or more years of service.

- Among Soldiers in their first 2 years of service, the association was constant, regardless of deployment status. Among soldiers with 3 or more years of service, the association was higher for those never deployed and currently deployed than for those previously deployed.

- To our knowledge, this is the first study to examine and demonstrate an association between the aggregate frequency of IEDs and risk of suicide attempts among U.S. Army Soldiers. The findings suggest that the threat of new weapons may increase stress burden among Soldiers. Targeting risk perception and perceived preparedness, particularly early in a Soldier's career, may improve psychological resilience and reduce suicide risk.

32. A Genome-Wide Gene-by-Trauma Interaction Study of Alcohol Misuse in Two Independent Cohorts Identifies PRKG1 as a Risk Locus (Polimanti, et al 2017)

- Traumatic life experiences are associated with alcohol use problems, an association that is likely to be moderated by genetic predisposition.

- To better understand these interactions, a gene-by-environment genome-wide interaction study (GEWIS) of alcohol use problems was conducted in two independent cohorts: Army STARRS (N=16,361) and Yale-Penn (N=8,084).

- In African-American subjects, an interaction of PRKG1 with trauma exposure in the STARRS cohort was identified and replicated in the Yale-Penn cohort.

- PRKG1 encodes cyclic GMP-dependent protein kinase 1, which is involved in learning, memory and circadian rhythm regulation.

- Considering the loci identified in stage-1 that showed same effect directions in stage-2, the gene ontology (GO) enrichment analysis showed several significant results, including calcium-activated potassium channels, cognition, locomotion and Stat3 protein regulation.

- This was the largest GEWIS performed in psychiatric genetics, and the first GEWIS examining risk for alcohol misuse. The results add to a growing body of literature highlighting the dynamic impact of experience on individual genetic risk.

33. Sexual Assault Victimization and Mental Health Treatment, Suicide Attempts, and Career Outcomes among Women in the U.S. Army (Rosellini, et al 2017)

- This study examined associations of administratively recorded sexual assault victimization during military service with subsequent mental health and negative career outcomes among U.S. Army women controlling for non-random victimization exposure.

- Used propensity score methods to match all 4,238 female Regular Army Soldiers with administratively recorded sexual assault victimization during 2004 to 2009 to five controls per case with similar composite victimization risk.

- Examined associations of this victimization measure with administratively recorded mental health treatment, suicide attempt, and Army career outcomes over the subsequent 12 months by using survival analysis for dichotomous outcomes and conditional generalized linear models for continuous outcomes.

- Women with administratively recorded sexual assault had significantly elevated odds ratios of subsequent mental health treatment, posttraumatic stress disorder treatment, suicide attempt, demotion, and attrition.

- Conclusion was sexual assault victimization is associated with considerable suffering and likely decreased force readiness.

34. Health Care Contact and Suicide Risk Documentation Prior to Suicide Death: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Ribeiro, et al 2017)

- Prior research has shown that a substantial portion of suicide decedents access health care in the weeks and months before their death. This study examined whether this is true among Soldiers.

- The sample included the 569 Regular Army Soldiers in the U.S. Army who died by suicide on active duty between 2004 and 2009 compared to 5,690 matched controls.

- Analyses examined the prevalence and frequency of health care contacts and documentation of suicide risk (i.e., the presence of prior suicidal thoughts and behaviors) over the year preceding suicide death. Predictors of health care contact and suicide risk documentation were also examined.

- Approximately 50% of suicide decedents accessed health care in the month prior to their death, and more than 25% of suicide decedents accessed health care in the week prior to their death.

- Mental health encounters were significantly more prevalent among suicide decedents. Despite this, risk documentation was rare among suicide decedents (4 weeks: 13.8%; 52 weeks: 24.5%).

- Suicide decedents who were male, never married, and non-Hispanic Black were less likely to access care prior to death. Number of mental health encounters was the only predictor of suicide risk documentation among decedents at 4 weeks and 52 weeks prior to their death.

- Conclusion was many Soldiers who die by suicide access health care shortly before death, presenting an opportunity for suicide prevention. However, in most cases, there was no documentation of prior suicidal thoughts or behaviors, highlighting the need for improvements in risk detection and prediction. Increasing the frequency, scope, and accuracy of risk assessments, especially in mental health care settings, may be particularly useful.

35. Associations of Childhood Bullying Victimization with Lifetime Suicidal Behaviors among New U.S. Army Soldiers (Campbell-Sills, et al 2017)

- Prior studies have documented associations of childhood bullying victimization with suicidal behaviors. Many failed to adjust for concomitant risk factors and none investigated this relationship in military personnel. The aim of this study was to estimate independent associations of childhood bullying victimization with suicidal behaviors among U.S. Army soldiers.

- Soldiers reporting for basic training completed a cross-sectional survey assessing mental disorders, suicidal behaviors, and childhood adversities including two types of bullying victimization: (1) Physical Assault/Theft and (2) Bullying Comments/Behaviors.

- Associations of childhood bullying experiences with suicidal behaviors were estimated using discrete-time survival analysis of person–year data from 30,436 Soldiers. Models adjusted for sociodemographic factors, childhood maltreatment by adults, and mental disorders.

- After comprehensive adjustment for other risk factors, more frequent Physical Assault/Theft by peers during childhood was associated with increased odds of lifetime suicidal ideation and attempt.

- More frequent Bullying Comments/Behaviors were associated with increased risk of ideation, plan, attempt, and onset of plan among ideators.

- Relative to no bullying victimization, exposure to the most persistent bullying was associated with two- to fourfold increase in risk for suicidal behaviors.

- The conclusion was childhood bullying victimization is associated with lifetime suicidal behaviors in new Soldiers. Exposure to Bullying Comments/Behaviors during childhood is associated with progression from suicidal ideation to plan. Improved recognition of these relationships may inform risk mitigation interventions for Soldiers.

36. Using Self-Report Surveys at the Beginning of Service to Develop Multi-Outcome Risk Models for New Soldiers in the U.S. Army (Rosellini, et al 2017)

- The Army uses universal preventive interventions for several negative outcomes (e.g., suicide, violence, sexual assault) with especially high risks in the early years of service. More intensive interventions exist, but would be cost-effective only if targeted at high-risk Soldiers. This study developed models for such targeting from self-report surveys administered at the beginning of Army service.

- The study included 21,832 new Soldiers who completed a self-administered questionnaire (SAQ) in 2011–2012 and consented to link administrative data to SAQ responses. Penalized regression models were developed for 12 administratively recorded outcomes occurring by December 2013: suicide attempt, mental hospitalization, positive drug test, traumatic brain injury (TBI), other severe injury, several types of violence perpetration and victimization, demotion, and attrition.

- The best-performing models were for TBI, major physical violence perpetration, sexual assault perpetration, and suicide attempt. Although predicted risk scores were significantly correlated across outcomes, prediction was not improved by including risk scores for other outcomes in models.

- 40.5% of suicide attempts occurred among the 10% of new Soldiers with highest predicted risk, 57.2% of male sexual assault perpetrations among the 15% with highest predicted risk, and 35.5% of female sexual assault victimizations among the 10% with highest predicted risk.

- The conclusion was data collected at the beginning of service in self-report surveys could be used to develop risk models that define small proportions of new Soldiers accounting for high proportions of negative outcomes over the first few years of service.

37. Childhood Adversity, Adult Stress, and the Risk of Major Depression or Generalized Anxiety Disorder in U.S. Soldiers: a Test of the Stress Sensitization Hypothesis (Bandoli, et al 2017)

- The stress sensitization theory hypothesizes that individuals exposed to childhood adversity will be more vulnerable to mental disorders from proximal stressors. This study aimed to test this theory with respect to risk of 30-day major depressive episode (MDE) and generalized anxiety disorder (GAD) among new U.S. Army Soldiers.

- The sample consisted of 30,436 new Soldier recruits in the Army Study to Assess Risk and Resilience (Army STARRS). Generalized linear models were constructed, and additive interactions between childhood maltreatment profiles and level of 12-month stressful experiences on the risk of 30-day MDE and GAD were analyzed.

- Stress sensitization was observed in models of past 30-day MDE and GAD. This sensitization only occurred at high (3+) levels of reported 12-month stressful experiences.

- In pairwise comparisons for the risk of 30-day MDE, the risk difference between 3+ stressful experiences and no stressful experiences was significantly greater for all maltreatment profiles relative to no maltreatment.

- Similar results were found with the risk for 30-day GAD with the exception of the risk difference for episodic emotional and sexual abuse, which did not differ statistically from no maltreatment.

- This study found that new Soldiers are at an increased risk of 30-day MDE or GAD following recent stressful experiences if they were exposed to childhood maltreatment.

- Particularly in the military with an abundance of unique stressors, attempts to identify this population and improve stress management may be useful in the effort to reduce the risk of mental disorders.

38. Psychological Autopsy Study Comparing Suicide Decedents, Suicide Ideators, and Propensity Score Matched Controls: Results from the Study to Assess Risk and Resilience in Service Members (Army STARRS) (Nock, et al 2017)

- The suicide rate has increased significantly among U.S. Army Soldiers over the past decade. This study reports the first results from a large psychological autopsy study using two control groups designed to reveal risk factors for suicide death among Soldiers beyond known socio-demographic factors and the presence of suicide ideation.

- Informants were next-of-kin and Army supervisors for 135 suicide cases, 137 control Soldiers propensity-score-matched on known socio-demographic risk factors for suicide and Army history variables, and 118 control Soldiers who reported suicide ideation in the past year.

- Results revealed that most (79.3%) Soldiers who died by suicide have a prior mental disorder; mental disorders in the prior 30-days were especially strong risk factors for suicide death.

- Approximately half of suicide decedents tell someone that they are considering suicide.

- Virtually all of the risk factors identified in this study differed between suicide cases and propensity-score-matched controls, but did not significantly differ between suicide cases and suicide ideators.

- The most striking difference between suicides and ideators was the presence in the former of an internalizing disorder (especially depression) and multi-morbidity (i.e., 3+ disorders) in the past 30 days.

- This study found that most Soldiers who die by suicide have identifiable mental disorders shortly before their death and tell others about their suicidal thinking, suggesting that there are opportunities for prevention and intervention. However, few risk factors distinguish between suicide ideators and decedents, pointing to an important direction for future research.

39. Childhood Maltreatment and Lifetime Suicidal Behaviors among New Soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Stein, et al 2017)

- Understanding suicide risk is a priority for the U.S. military. This study aimed to estimate associations of childhood maltreatment with pre-enlistment suicidal behaviors in new Army Soldiers using cross-sectional survey data from 38,237 Soldiers reporting for basic training from April 2011 through November 2012.

- Scales assessing retrospectively reported childhood abuse and neglect were derived and subjected to latent class analysis, which yielded 5 profiles: No Maltreatment, Episodic Emotional Maltreatment, Frequent Emotional/Physical Maltreatment, Episodic Emotional/Sexual Abuse, and Frequent Emotional/Physical/Sexual Maltreatment.

- Discrete-time survival analysis was used to estimate associations of maltreatment profiles with suicidal behaviors (assessed with a modified Columbia-Suicide Severity Rating Scale), adjusting for socio-demographics and mental disorders.

- Nearly 1 in 5 new Soldiers was classified as experiencing childhood maltreatment.

- Relative to No Maltreatment, all multivariate maltreatment profiles were associated with elevated odds of lifetime suicidal ideation, attempt, and onset of plan among those with ideation.

- Several profiles also predicted attempts among those with plans, and Frequent Emotional/Physical/Sexual Maltreatment predicted unplanned attempts among ideators.

- Adjustment for mental disorders attenuated but did not eliminate these associations.

- Childhood maltreatment is strongly associated with suicidal behavior among new Soldiers, even after adjusting for intervening mental disorders.

- Among soldiers with lifetime ideation, certain maltreatment profiles are associated with elevated odds of subsequently planning and/or attempting suicide.

- Focus on childhood maltreatment might reveal avenues for risk reduction among new Soldiers.

40. Suicide Attempts in U.S. Army Combat Arms, Special Forces and Combat Medics (Ursano, et al 2017)

- The U.S. Army suicide attempt rate increased sharply during the wars in Iraq and Afghanistan. Risk may vary according to occupation, which significantly influences the stressors that Soldiers experience.

- Using administrative data from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS), this study identified person-month records for all active duty Regular Army enlisted Soldiers who had a medically documented suicide attempt from 2004 through 2009 (n = 9,650) and an equal-probability sample of control person-months (n = 153,528).

- Logistic regression analyses examined the association of combat occupation (combat arms, special forces, combat medics) with suicide attempt, adjusting for socio-demographics, service-related characteristics, and prior mental health diagnosis.

- In adjusted models, the odds of attempting suicide were higher in combat arms and combat medics, but lower in special forces, compared to all other occupations.

- Combat arms and combat medics had higher odds of suicide attempt than other occupations if never deployed or previously deployed, but not when currently deployed.

- Occupation was associated with suicide attempt in the first ten years of service, but not beyond.

- In the first year of service, primarily a time of training, combat medics had higher odds of suicide attempt than both combat arms and other occupations.

- Discrete-time hazard functions revealed that these occupations had distinct patterns of monthly risk during the first year of service.

- This study found that military occupation can inform the understanding suicide attempt risk among Soldiers.

41. Lifetime Suicidal Behaviors and Career Characteristics Among U.S. Army Soldiers (Millner, et al 2017)

- This study presented data on lifetime prevalence of suicide ideation and non-fatal attempts as reported by the large representative sample of U.S. Army Soldiers who participated in the Consolidated All Army Study (n = 29,982). The study also examined associations of key Army career characteristics with these outcomes.

- Prevalence estimates for lifetime suicide ideation were 12.7% among men and 20.1% among women, and for lifetime suicide attempts were 2.5% and 5.1%, respectively.

- Retrospective age-of-onset reports suggested that 53.4% to 70% of these outcomes had pre-enlistment onsets.

- Results revealed that, for both men and women, being in the Regular Army, compared with being in the National Guard or Army Reserve, and being in an enlisted rank, compared with being an officer, is associated with increased risk of suicidal behaviors and that this elevated risk is present both before and after joining the Army.

42. Risk of Suicide Attempt Among Soldiers in Army Units With a History of Suicide Attempts (Ursano, et al 2017)

- This study examined whether a Soldier's risk of suicide attempt is influenced by previous suicide attempts in that Soldier's unit.

- Using administrative data from the Army Study to Assess Risk and Resilience in Servicemembers (STARRS), this study identified person-month records for all active-duty, regular U.S. Army, enlisted Soldiers who attempted suicide from January 1, 2004 through December 31, 2009 (n = 9,650), and an equal-probability sample of control person-months (n = 153,528).

- Logistic regression analyses examined the number of past-year suicide attempts in a Soldier's unit as a predictor of subsequent suicide attempt, controlling for socio-demographic features, service-related characteristics, prior mental health diagnosis, and other unit variables, including suicide-, combat-, and unintentional injury–related unit deaths.

- The study also examined whether the influence of previous unit suicide attempts varied by military occupational specialty (MOS) and unit size.

- Of the final analytic sample of 9,512 enlisted Soldiers who attempted suicide and 151,526 control person-months, most were male (86.4%), 29 years or younger (68.4%), younger than 21 years when entering the Army (62.2%), white (59.8%), high school educated (76.6%), and currently married (54.8%).

- In adjusted models, Soldiers were more likely to attempt suicide if 1 or more suicide attempts occurred in their unit during the past year (odds ratios [ORs], 1.4-2.3; $P < .001$), with odds increasing as the number of unit attempts increased.*

- The odds of suicide attempt among Soldiers in a unit with 5 or more past-year attempts was more than twice that of Soldiers in a unit with no previous attempts (OR, 2.3; 95%CI, 2.1-2.6).

- The association of previous unit suicide attempts with subsequent risk was significant whether Soldiers had a combat arms MOS or other MOS (ORs, 1.4-2.3; $P < .001$) and regardless of unit size, with the highest risk among those in smaller units (1-40 Soldiers) (ORs, 2.1-5.9; $P < .001$).*

- The population-attributable risk proportion for 1 or more unit suicide attempts in the past year indicated that, if this risk could be reduced to no unit attempts, 18.2% of attempts would not occur.

- Units with a history of suicide attempts may be important targets for preventive interventions.

43. Predicting Sexual Assault Perpetration in the U.S. Army Using Administrative Data (Rosellini, et al 2017)

- This study developed actuarial models to identify male U.S. Army Soldiers at high risk of administratively recorded sexual assault perpetration.

- This study investigated administratively recorded sexual assault perpetration among the 821,807 male Army Soldiers serving 2004–2009.

- Penalized discrete-time (person-month) survival analysis was used to select the smallest possible number of stable predictors to maximize number of sexual assaults among the 5% of Soldiers with highest predicted risk of perpetration (top-ventile concentration of risk). Separate models were developed for assaults against non-family and intra-family adults and minors.

- There were 4,640 male Soldiers found to be perpetrators against non-family adults, 1,384 against non-family minors, 380 against intra-family adults, and 335 against intra-family minors.

- Top-ventile concentration of risk was 16.2%–20.2% predicting perpetration against non-family adults and minors, and 34.2%–65.1% against intra-family adults and minors. Final predictors consisted largely of measures of prior crime involvement and the presence and treatment of mental disorders.

- Administrative data can be used to develop actuarial models that identify a high proportion of sexual assault perpetrators. If a system is developed to consolidate administrative predictors routinely, then predictions could be generated periodically to identify those in need of preventive intervention. Whether this would be cost effective, though, would depend on intervention costs, effectiveness, and competing risks.

44. Genome-wide Association Studies of Suicide Attempts in U.S. Soldiers (Stein, et al 2017)

- This study utilized population-based non-clinical cohorts of U.S. military personnel (discovery: n = 473 cases and n = 9778 control subjects; replication: n = 135 cases and n = 6879 control subjects) and a clinical case-control sample of recent suicide attempters (n = 51 cases and n = 112 control subjects) to conduct GWAS of suicide attempts (SA).

- Genome-wide association was evaluated within each ancestral group (European-, African-, Latino-American) and study using logistic regression models.

- Meta-analysis of the European ancestry discovery samples revealed a genome-wide significant locus in association with SA near MRAP2 (melanocortin 2 receptor accessory protein 2) and CEP162 (centrosomal protein 162); 12 genome-wide significant SNPs in the region; peak SNP rs12524136-T, OR = 2.88, p = 5.24E-10.

- These findings were not replicated in the European ancestry subsamples of the replication or suicide attempters samples. However, the association of the peak SNP remained significant in a meta-analysis of all studies and ancestral subgroups (OR = 2.18, 95%CI 1.70, 2.80).

- Polygenic risk score (PRS) analyses showed some association of SA with bipolar disorder.

- The association with SNPs encompassing MRAP2, a gene expressed in brain and adrenal cortex and involved in neural control of energy homeostasis, points to this locus as a plausible susceptibility gene for suicidality that should be further studied. Larger sample sizes will be needed to confirm and extend these findings.

45. Prior Mental Disorders and Lifetime Suicidal Behaviors among U.S. Army Soldiers in the Army Study to Assess Risk and Resilience in Servicemembers (Millner, et al 2017)

- This study examined associations of prior mental disorders and Army career characteristics with subsequent first onset of suicidal behaviors in a large, representative sample of U.S. Army Soldiers from the consolidated All Army Study (n=29,982).

- Among men and women, all self-reported lifetime disorders measured (some assessed with screening scales) are associated with subsequent onset of suicide ideation.

- Among men, three disorders characterized by agitation and impulsiveness (intermittent explosive disorder, panic disorder, and substance disorders) predict the transition from suicide ideation to attempt.

- For both men and women, being in the Regular Army (vs. National Guard or Army Reserve) predicts suicide attempts in the total sample.

- For men, a history of deployment and junior rank are predictors of suicide attempts after adjusting for pre-enlistment disorders but not accounting for pre- and post-enlistment disorders, suggesting that post-enlistment disorders account for some of the increased suicide risk among these career characteristics.

- The results highlight associations between mental disorders and suicidal behaviors, but underscore limitations predicting which people with ideation attempt suicide.

46. Documented Family Violence and Risk of Suicide Attempt among U.S. Army Soldiers (Ursano, et al 2017)

- Person-month records of active duty, Regular Army, enlisted Soldiers with medically documented suicide attempts (SA) (n=9,650), and a sample of control person-months (n=153,528), were selected from administrative data in 2004 to 2009 to examine associations of family violence (FV) history with SA risk among Soldiers. Logistic regression analyses were used to examine associations of FV with SA, adjusting for socio-demographics, service-related characteristics, and prior mental health diagnosis.

- Odds of SA were higher in Soldiers with a FV history and increased as the number of FV events increased.

- Soldiers experiencing past-month FV were almost five times as likely to attempt suicide as those with no FV history.

- Odds of SA were elevated for both perpetrators and those who were exclusively victims. Male perpetrators had higher odds of SA than male victims, whereas female perpetrators and female victims did not differ in SA risk.

- A discrete-time hazard function indicated that SA risk was highest in the initial months following the first FV event.

- Findings indicate that FV is an important consideration in understanding risk of SA among Soldiers.

47. Prospective Risk Factors for Post-Deployment Heavy Drinking and Alcohol or Substance Use Disorder among U.S. Army Soldiers (Campbell-Sills, et al 2017)

- This study estimated prevalence of alcohol misuse among 4,645 U.S. Army Soldiers who participated in a longitudinal survey.

- Assessment occurred 1–2 months before Soldiers deployed to Afghanistan in 2012 (T0), upon their return to the U.S. (T1), 3 months later (T2), and 9 months later (T3).

- Weights-adjusted logistic regression was used to evaluate associations of hypothesized risk factors with post-deployment incidence and persistence of heavy drinking (HD) (consuming 5 + alcoholic drinks at least 1–2×/week) and alcohol or substance use disorder (AUD/SUD).

- Prevalence of past-month HD at T0, T2, and T3 was 23.3% (S.E. = 0.7%), 26.1% (S.E. = 0.8%), and 22.3% (S.E. = 0.7%); corresponding estimates for any binge drinking (BD) were 52.5% (S.E. = 1.0%), 52.5% (S.E. = 1.0%), and 41.3% (S.E. = 0.9%).

- Greater personal life stress during deployment (e.g., relationship, family, or financial problems) – but not combat stress – was associated with new onset of HD at T2 [per standard score increase: adjusted odds ratio (AOR) = 1.20, 95% CI 1.06–1.35, p = 0.003]; incidence of AUD/SUD at T2 (AOR = 1.54, 95% CI 1.25–1.89, p < 0.0005); and persistence of AUD/SUD at T2 and T3 (AOR = 1.30, 95% CI 1.08–1.56, p = 0.005).

- Any BD pre-deployment was associated with post-deployment onset of HD (AOR = 3.21, 95% CI 2.57–4.02, p < 0.0005) and AUD/SUD (AOR = 1.85, 95% CI 1.27–2.70, p = 0.001).

- Alcohol misuse is common during the months preceding and following deployment. Timely intervention aimed at alleviating/managing personal stressors or curbing risky drinking might reduce risk of alcohol-related problems post-deployment.

48. Predictive Validity and Correlates of Self-Assessed Resilience among U.S. Army Soldiers (Campbell-Sills, et al 2017)

- This study evaluated the validity of self-assessed resilience among U.S. Army Soldiers, including whether pre-deployment perceived resilience predicted post-deployment emotional disorder.

- Resilience was assessed via self-administered questionnaire among 35,807 new Soldiers reporting for basic training and 8,558 experienced Soldiers preparing to deploy to Afghanistan. Concurrent validity of self-assessed resilience was evaluated among recruits by estimating its association with past-month emotional disorder.

- Predictive validity was examined among 3,526 experienced Soldiers with no lifetime emotional disorder pre-deployment. Predictive models estimated associations of pre-deployment resilience with incidence of emotional disorder through 9 months post-deployment and with marked improvement in coping at 3 months post-deployment.

- Soldiers characterized themselves as very resilient on average [M = 14.34, SD = 4.20 (recruits); M = 14.75, SD = 4.31 (experienced Soldiers); theoretical range = 0-20].

- Demographic characteristics exhibited only modest associations with resilience, while severity of childhood maltreatment was negatively associated with resilience in both samples.

- Among recruits, resilience was inversely associated with past-month emotional disorder [adjusted odds ratio (AOR) = 0.65, 95% CI = 0.62-0.68, P < .0005 (per standard score increase)].

- Among deployed Soldiers, greater pre-deployment resilience was associated with decreased incidence of emotional disorder (AOR = 0.91; 95% CI = 0.84-0.98; P = .016) and increased odds of improved coping (AOR = 1.36; 95% CI = 1.24-1.49; P < .0005) post-deployment.

- Findings supported validity of self-assessed resilience among Soldiers, although its predictive effect on incidence of emotional disorder was modest. In conjunction with assessment of known risk factors, measurement of resilience could help predict adaptation to foreseen stressors like deployment.

49. Medical-encounter Mental Health Diagnoses, Non-fatal Injury and Polypharmacy Indicators of Risk for Accident Death in the U.S. Army Enlisted Soldiers, 2004-2009 (Lewandowski-Romps, et al 2017)

- Accidents are a leading cause of deaths in active duty personnel and understanding accident deaths during wartime could facilitate future operational planning and inform risk prevention efforts.

- This study used 2004-2009 military records for enlisted, active duty, Regular Army Soldiers to identify mental health, injury, and polypharmacy (multiple narcotic and/or psychotropic medications) predictors of accident deaths for current, previously, and never deployed groups during the Afghanistan and Iraq wars.

- Deployed Soldiers with anxiety diagnoses showed higher risk for accident deaths. More than half had anxiety diagnoses prior to being deployed, suggesting anticipatory anxiety or symptom recurrence may contribute to high risk.

- Traumatic brain injury (TBI) indicated higher risk for accident deaths among previously deployed Soldiers. Two-thirds of these Soldiers had first TBI medical-encounter while non-deployed, but mild, combat-related TBIs may have been undetected during deployments.

- Post-Traumatic Stress Disorder (PTSD) predicted higher risk of accident death for never deployed Soldiers, as did polypharmacy which may relate to reasons for deployment ineligibility.

- The higher risk of accident death predicted by PTSD among those never deployed suggests the importance of identification, treatment, and prevention of non-combat traumatic events.

- Accident death risk predictors overlapped with those identified for suicides which suggests effective intervention might reduce both types of deaths.

50. Trauma Exposure Interacts with the Genetic Risk of Bipolar Disorder in Alcohol Misuse of U.S. Soldiers (Polimanti, et al 2017)

- This study investigated whether trauma exposure modified the association of genetic risks for mental disorders with alcohol misuse and nicotine dependence (ND) symptoms by calculating high-resolution polygenic risk scores (PRSs) for 10,732 U.S. Army Soldiers (8,346 trauma-exposed and 2,386 trauma-unexposed) based on genome-wide association studies of bipolar disorder (BD), major depressive disorder, and schizophrenia.

- The study found a significant BD PRS-by-trauma interaction with respect to alcohol misuse; a positive correlation between BD PRS and alcohol misuse in trauma-exposed Soldiers; and a negative correlation in trauma-unexposed Soldiers.

- The variants included in the BD PRS-by-trauma interaction showed significant enrichments for gene ontologies related to high voltage-gated calcium channel activity and for Beta1/Beta2 adrenergic receptor signaling pathways.

- The results indicated that the genetic overlap between alcohol misuse and BD is significantly moderated by trauma exposure. This study provides molecular insight into the complex mechanisms that link substance abuse, psychiatric disorders, and trauma exposure.

51. Genome-Wide Analysis of Insomnia Disorder (Stein, et al 2018)

- Insomnia is a worldwide problem with substantial deleterious health effects. Twin studies have shown a heritable basis for various sleep-related traits, including insomnia, but robust genetic risk variants have just recently begun to be identified.

- This study involved genome-wide association studies (GWAS) of Soldiers in Army STARRS. GWAS were carried out separately for each ancestral group (EUR, AFR, LAT) using logistic regression for each of the STARRS component studies (including 3,237 cases and 14,414 controls), and then meta-analysis was conducted across studies and ancestral groups.

- Heritability (SNP-based) for lifetime insomnia disorder was significant in EUR. A meta-analysis including three ancestral groups and three study cohorts revealed a genome-wide significant locus on Chr 7 and a genome-wide significant gene-based association in EUR for RFX3 on Chr 9. Polygenic risk for sleeplessness/insomnia severity in UK Biobank was significantly positively associated with likelihood of insomnia disorder in STARRS.

- Genetic contributions to insomnia disorder in STARRS were significantly positively correlated with major depressive disorder and type 2 diabetes, and negatively with morningness chronotype and subjective well-being in external datasets.

- Insomnia associated loci may contribute to the genetic risk underlying a range of health conditions including psychiatric disorders and metabolic disease.

52. Risk Factors for the Transition from Suicide Ideation to Suicide Attempt: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Nock, et al 2018)

- Prior research has shown that most known risk factors for suicide attempts in the general population actually predict suicide ideation rather than attempts among ideators. Yet clinical interest in predicting suicide attempts often involves the evaluation of risk among patients with ideation.

- This study examined a number of characteristics of suicidal thoughts hypothesized to predict incident attempts in a retrospective analysis of lifetime ideators (N = 3,916) drawn from a large (N = 29,982), representative sample of U.S. Army Soldiers.

- The most powerful predictors of first nonfatal lifetime suicide attempt in a multivariate model controlling for previously known predictors (e.g., demographics, mental disorders) were: recent onset of ideation, presence and recent onset of a suicide plan, low controllability of suicidal thoughts, extreme risk-taking or "tempting fate," and failure to answer questions about the characteristics of one's suicidal thoughts.

- A predictive model using these risk factors had strong accuracy (area under the curve [AUC] = .93), with 66.2% of all incident suicide attempts occurring among the 5% of Soldiers with highest composite predicted risk.

- This high concentration of risk in this retrospective study suggests that a useful clinical decision support model could be constructed from prospective data to identify those with highest risk of subsequent suicide attempt.

53. Improving risk prediction accuracy for new soldiers in the U.S. Army by adding self-report survey data to administrative data (Bernecker, et al 2018)

- The Army STARRS New Soldier Survey was administered to 21,790 Regular Army Soldiers who agreed to have their survey data linked to their administrative data. Machine-learning models using administrative data as predictors found that small proportions of high-risk Soldiers accounted for high proportions of negative outcomes including mental disorders, suicidality, and interpersonal violence.

- This study examined the extent to which this survey information increased prediction accuracy, over models based solely on administrative data, for these outcomes.

- The study used discrete time survival analysis to estimate a series of models predicting first occurrence, assessing how model fit improved and concentration of risk increased when adding the predicted risk score based on survey data to the predicted risk score based on administrative data.

- The addition of survey data improved prediction significantly for all outcomes. In the most extreme case, the percentage of reported sexual violence victimization among the 5% of female soldiers with highest predicted risk increased from 17.5% using only administrative predictors to 29.4% adding survey predictors, a 67.9% proportional increase in prediction accuracy. Other proportional increases in concentration of risk ranged from 4.8% to 49.5% (median = 26.0%).

- The researchers concluded that the Army may benefit from routinely administering surveys that assess additional risk factors, such as the New Soldier Survey, because the data from the surveys could substantially improve accuracy of risk models compared to models based exclusively on administrative predictors.

54. Associations of Time-Related Deployment Variables with Risk of Suicide Attempt Among Soldiers (Ursano, et al 2018)

- This study was designed to determine whether risk of suicide attempt (SA) among Soldiers is associated with time-related deployment characteristics such as time in service prior to first deployment, length of deployment, and length of time between deployments (dwell time).*

- It was a longitudinal, retrospective cohort study that used administrative data from 2004 through 2009 to identify person-month records of active-duty Regular Army enlisted Soldiers who had served continuously in the Army for at least 2 years. Study included 593 medically-documented suicide attempters and 19,034 control person-months for Soldiers who deployed exactly twice.*

- Findings indicate the risk of SA during or after second deployment was higher for those who initially deployed within the first 12 months of service, and for those with a dwell time of 6 months or less.*

- Length of first deployment was not associated with subsequent SA.

- Time in service prior to first deployment and dwell time are modifiable risk factors for SA risk among Soldiers.*

- The Army's continued focus on dwell time may help mitigate a range of negative outcomes and reduce risk of suicidal behavior.

55. Nonfatal Suicidal Behaviors in the Administrative Records of Activated U.S. Army National Guard and Army Reserve Soldiers, 2004–2009 (Ursano, et al 2018)

- The Army suicide rate increased sharply during the wars in Iraq and Afghanistan. There is limited information about medically-documented, nonfatal suicidal behaviors among Soldiers in the Army's Reserve Component (RC), which is composed of the Army National Guard and Army Reserve.

- This study used administrative records for all Soldiers on active duty for the years 2004 through 2009 (n = 1.66 million) to examine trends and socio-demographic correlates of suicide attempts, suspicious injuries, and suicide ideation among activated RC Soldiers. The study identified 2,937 unique RC Soldiers with a documented nonfatal suicidal event.

- The study found increases in the annual incidence rates of suicide attempts (71 to 204/100,000 person-years) and suicide ideation (326 to 425/100,000 person years). Incidence rates for suspicious injuries also generally increased but were more variable.

- Using hierarchical classification rules, the study identified the first instance of each Soldier's most severe behavior (suicide attempt versus suspicious injury versus suicide ideation). For each of those suicide- or injury-related outcomes, the study found increased risk among those who were female, younger, non-Hispanic White, less educated, never married, and lower-ranking enlisted.

- The socio-demographic associations differed significantly across outcomes, although the patterns were similar.

- The results provide a broad overview of nonfatal suicidal trends in the RC during the period 2004 through 2009, and demonstrate that integration of multiple administrative data systems enriches analysis of the predictors of such events.

56. Pre-deployment Predictors of Psychiatric Disorder-Symptoms and Interpersonal Violence during Combat Deployment (Rosellini, et al 2018)

- Preventing suicides, mental disorders, and noncombat-related interpersonal violence during deployment are priorities of the U.S. Army.

- This study used pre-deployment survey and Army administrative data to develop actuarial models to identify Soldiers at high risk of these outcomes during combat deployment. The models were developed for Soldiers in the Pre-Post Deployment Study, a panel study of Soldiers deployed to Afghanistan in 2012–2013 who completed self-administered questionnaires before deployment and one month (T1), three months (T2), and nine months (T3) after deployment, and consented to linking their survey data to their Army administrative data.

- Seven "during-deployment" outcomes were assessed using post-deployment surveys either at T1 (n = 7,048) or at T2–T3 (n = 7,081). Machine learning was used to develop a model for each outcome from 273 pre-deployment predictors which were compared to simple logistic regression models.

- The relative improvement in area under the receiver operating characteristic curve (AUC) obtained by machine learning compared to the logistic models ranged from 1.11 (major depression) to 1.83 (suicidality). The best-performing machine learning models were for major depression (AUC=0.88), suicidality (0.86), and generalized anxiety disorder (0.85).

- Roughly 40% of these outcomes occurred among the 5% of Soldiers with highest predicted risk.

- Actuarial models could be used to identify high risk Soldiers either for exclusion from deployment or preventive interventions. The ultimate value of this approach depends on the associated costs, competing risks (e.g., stigma), and effectiveness of to-be-determined interventions.

57. Risk Factors Associated with Attempted Suicide among U.S. Army Soldiers without a History of Mental Health Diagnosis (Ursano, et al 2018)

- This study was designed to examine predictors of suicide attempt among Soldiers without a previous mental health diagnosis.

- Using Army and DoD administrative data from 2004-2009, the study identified person-month records for all active duty Regular Army enlisted Soldiers who had a medically documented suicide attempt (n=9,650), and an equal-probability sample of control person-months (n=153,528), then examined whether predictors of suicide attempt varied by history of mental health diagnosis.

- Suicide attempts were identified using DoD Suicide Event Report records and ICD-9 E95x diagnostic codes. Mental health diagnoses and related codes (as well as socio-demographic, service-related, physical healthcare, crime, and family violence variables) were constructed from Army personnel, medical, legal, and family services records.

- The study found 36.3% (n=3,507) of Soldiers who attempted suicide did not have a previous mental health diagnosis.*

- Among Soldiers with no previous diagnosis, the highest adjusted odds of suicide attempt were for females, less than high school education, in first year of service, previously deployed, promotion delayed 2 months or less, past-year demotion, 8 or more outpatient physical health care visits in the past 2 months, past-month injury-related outpatient and inpatient health care visit, previous combat injury, minor violent crime victimization, major violent crime perpetration, and family violence.*

- Most of these variables were also associated with suicide attempts among Soldiers with a previous mental health diagnosis, although the strength of associations differed.*

- The study concluded that suicide attempt risk among Soldiers with unrecognized mental health problems is a significant and important challenge, and administrative records from personnel, medical, legal, and family services systems can assist in identifying Soldiers at risk.*

58. Patterns and Predictors of Persistence of Suicide Ideation: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS) (Nock, et al 2018)

- Persistent suicide ideation (SI) is known to be a risk factor for subsequent suicidal behaviors. Reducing SI persistence among people with a history of SI may be a useful target for preventive intervention, but basic information is lacking about patterns and predictors of SI persistence.

- Based on retrospective data on annual SI persistence in a representative sample of 3,501 U.S. Army Soldiers with lifetime SI, age-of-onset and number of years with SI were used to estimate two definitions of persistence: persistence beyond year-of-onset and proportional annual persistence.

- For 47.8% of respondents with lifetime SI, their SI did not persist beyond the year-of-onset. For the 52.2% whose SI did persist beyond the year-of-onset, the median (inter-quartile range) proportional annual persistence was 33% (17-67%).

- Significant predictors of increased persistence were different for respondents with pre-enlistment SI onset (prior histories of attention-deficit/hyperactivity disorder [ADHD], bipolar disorder, and panic disorder) and post-enlistment SI onset (male, combat support military occupation specialty, prior histories of ADHD, panic disorder, and posttraumatic stress disorder).

- These predictors of persistence are different from the predictors of SI onset, suggesting that secondary preventive interventions to reduce SI persistence may need to focus on different factors than primary preventive interventions to reduce SI onset.

59. Attention Deficit Hyperactivity Disorder and Risk of Posttraumatic Stress and Related Disorders: A Prospective Longitudinal Evaluation in U.S. Army Soldiers (Howlett, et al 2018)

- Aim of this study was to examine whether pre-deployment ADHD is associated with increased risk of post-deployment PTSD among U.S. Army Soldiers.

- Soldiers (n=4,612) who completed all assessments in the prospective Pre/Post Deployment Study of Soldiers deployed to Afghanistan comprised the sample to estimate association of pre-deployment ADHD with post-deployment PTSD.

- Also examined relationships of pre-deployment ADHD with post-deployment major depressive episode (MDE), generalized anxiety disorder (GAD), and suicidal ideation.

- Weighted prevalence of ADHD pre-deployment was 6.1% (SE=0.4%). Adjusting for other risk factors and pre-deployment PTSD, pre-deployment ADHD was associated with elevated odds of post-deployment PTSD (AOR= 2.13, 95% CI=1.51–3.00, p<.001).

- Pre-deployment ADHD was similarly associated with incidence of PTSD among Soldiers with no lifetime history (AOR= 2.50, 95% CI=1.69–3.69, p<.001).

- ADHD also displayed associations with post-deployment MDE (AOR=2.80, 95% CI=2.01-3.91, p<0.0005) and GAD (AOR=3.04, 95% CI=2.10-4.42, p<.001), but not suicidal ideation.

- Recognition of associations between pre-deployment ADHD and post-deployment PTSD, MDE, and GAD may inform targeted prevention efforts. Future research should examine whether treatment of ADHD is protective against PTSD and related disorders in trauma-exposed individuals.

60. Pre-deployment Insomnia is Associated with Post-deployment PTSD and Suicidal Ideation in US Army Soldiers (Wang, et al 2018)

- Insomnia is prevalent among military personnel and may increase risk of mental disorders and suicidal ideation. This study examined associations of pre-deployment insomnia with post-deployment post-traumatic stress disorder (PTSD) and suicidal ideation among U.S. Army Soldiers.

- Study included Soldiers from 3 Brigade Combat Teams who completed surveys 1–2 months before deploying to Afghanistan in 2012 (T0), on return from deployment (T1), 3 months later (T2), and 9 months later (T3). Logistic regression was used to estimate associations of pre-deployment (T0) insomnia with post-deployment (T2 or T3) PTSD and suicidal ideation among those who completed surveys at all waves (n = 4,645).

- Pre-deployment insomnia was associated with increased risk of post-deployment PTSD (adjusted odds ratio [AOR] = 3.14, 95% confidence interval [CI] = 2.58% to 3.82%, p < .0005) and suicidal ideation (AOR = 2.78, 95% CI = 2.07% to 3.74%, p < .0005) in models adjusting for socio-demographic characteristics and prior deployment history.

- Adjustment for other pre-deployment risk factors and deployment experiences attenuated these associations, but insomnia remained significantly associated with post-deployment PTSD (AOR = 1.50, 95% CI = 1.19% to 1.89%, p = .001) and suicidal ideation (AOR = 1.43, 95% CI = 1.04% to 1.95%, p = .027).

- Subgroup models showed that pre-deployment insomnia was associated with incident PTSD (AOR = 1.55, 95% CI = 1.17% to 2.07%, p = .003) and suicidal ideation (AOR = 1.67, 95% CI = 1.16% to 2.40%, p = .006) among Soldiers with no pre-deployment history of these problems.

- Study found that pre-deployment insomnia contributed to prediction of post-deployment PTSD and suicidal ideation in Army Soldiers, suggesting that detection of insomnia could facilitate targeting of risk mitigation programs.

61. Predicting Suicide Attempts among Soldiers who deny Suicidal Ideation (Bernecker, et al 2018)

- Most non-fatal suicide attempts and suicide deaths occur among patients who deny suicidal ideation (SI) during suicide risk screenings. But little is known about risk factors for suicidal behaviors among such patients. The study investigated this using a representative sample of U.S. Army Soldiers who denied lifetime SI in a survey and were then followed through administrative records for up to 45 months to learn of administratively-recorded suicide attempts (SA).

- Study used a novel two-stage risk assessment approach that combined first-stage prediction from administrative records to find the subsample of SI deniers with highest subsequent SA risk, then used survey reports to estimate a second-stage model identifying the subset of individuals in the high-risk subsample at highest SA risk.

- 70% of survey respondents denied lifetime SI. Administrative data identified 30% of this 70% who accounted for 81.2% of subsequent administratively-recorded SAs. A relatively small number of self-report survey variables were then used to create a prediction model that identified 10% of the first-stage high-risk sample (i.e., 3% of all Soldiers) at highest SA risk (accounting for 45% of SAs in the total sample).

- Study discussed potential applications of this approach for identifying future SI deniers at highest SA risk.

62. Transition to Suicide Attempt from Recent Suicide Ideation in U.S. Army Soldiers (Naifeh, et al 2018)

- Most people with suicide ideation (SI) do not attempt suicide (SA). Understanding the transition from current/recent SI to SA is important for mental health care. The objective of this study was to identify characteristics that differentiate SA from 30-day SI among representative U.S. Army Soldiers.

- The study used a unique case–control design including Soldiers recently hospitalized for SA (n = 132) and representative Soldiers from the same four communities (n = 10,193) who were administered the same questionnaire.

- The study systematically identified variables that differentiated suicide attempters from the total population, then examined whether those same variables differentiated all 30-day ideators (n = 257) from the total population, and attempters from non-attempting 30-day ideators.

- In univariable analyses, 20 of 23 predictors were associated with SA in the total population (0.05 level). The best multivariable model included 8 significant predictors: interpersonal violence, relationship problems, major depressive disorder, post-traumatic stress disorder (PTSD), and substance use disorder (all having positive associations), as well as past 12-month combat trauma, intermittent explosive disorder (IED), and any college education (all having negative associations).

- Six of these predictors differentiated 30-day ideators from the population. Three of these predictors differentiated attempters from ideators: past 30-day PTSD (OR = 6.7 [95% CI = 1.1–39.4]), past 30-day IED (OR = 0.2 [95% CI = 0.1–0.5]), and any college education (OR = 0.1 [95% CI = 0.0–0.6]). The 5% of ideators with highest predicted risk in this final model included 20.9% of attempters, a four-fold concentration of risk.

- Study concluded that combat exposure did not differentiate attempters from ideators, many SA risk factors in the Army population are actually risk factors for SI, and prospective Army research examining transition from SI to SA should consider PTSD, IED, and education.

63. Suicide Attempts among Activated Soldiers in the U.S. Army Reserve Components (Naifeh, et al 2019)

- Although the majority of active duty Soldiers are full-time personnel in the Active Component (AC), a substantial minority are in the Reserve Components (RCs). These "citizen-Soldiers" (Army National Guard and Army Reserve) experience many of the same stressors as AC Soldiers as well as stressors that are unique to their intermittent service. Despite the important role of RC Soldiers, the vast majority of military mental health research focuses on AC Soldiers. One important goal of Army STARRS was to address this gap.

- This was a longitudinal, retrospective cohort study that examined predictors of suicide attempts among activated RC Soldiers using individual-level person-month records from Army and Department of Defense administrative data systems to examine socio-demographic, service-related, and mental health predictors of medically documented suicide attempts from 2004 to 2009.

- Analysis used a discrete-time survival framework and included data from all 1,103 activated RC suicide attempters and an equal-probability sample of 69,867 control person-months.

- Study found that enlisted Soldiers comprised 84.3% of activated RC Soldiers and accounted for 95.7% of all activated RC suicide attempts (overall rate = 108/100,000 person-years, more than four times the rate among officers).

- Multivariable predictors of enlisted RC suicide attempts included being female, entering Army service at age ≥25, current age <30, non-Hispanic white, <high school education, currently married, having 1–2 years of service, being previously deployed (vs. currently deployed), and history of mental health diagnosis (particularly when documented in the previous month). Predictors among RC officers (overall rate = 26/100,000 person-years) included being female and receiving a mental health diagnosis in the previous month.

- Discrete-time hazard models showed suicide attempt risk among enlisted Soldiers was inversely associated with time in service.

- Study concluded that risk factors for suicide attempt in the RCs were similar to those previously observed in the AC, highlighting the importance of research and prevention focused on RC enlisted Soldiers in the early phases of Army service and those with a recent mental health diagnosis.

64. Prospective Associations of Perceived Unit Cohesion with Post-deployment Mental Health Outcomes (Anderson, et al 2019)

- Prior investigations have found negative associations between military unit cohesion and posttraumatic stress disorder (PTSD); however, most relied on cross-sectional data and few examined relationships of unit cohesion to other mental disorders. This study evaluated prospective associations of perceived unit cohesion with a range of mental health outcomes following combat deployment.

- Soldiers were surveyed approximately 1–2 months before deployment to Afghanistan (T0); and 1 month (T1), 3 months (T2), and 9 months (T3) after return from deployment. Logistic regression was performed to estimate associations of perceived unit cohesion at T0 with risk of PTSD, major depressive episode (MDE), generalized anxiety disorder (GAD), alcohol or substance use disorder (AUD/SUD), and suicidal ideation at T2 or T3 among 4,645 Soldiers who completed all study assessments. Models were adjusted for socio-demographic and Army service characteristics, pre-deployment history of the index outcome, and deployment stress exposure.

- Higher perceived unit cohesion at T0 was associated with lower risk of PTSD, MDE, GAD, AUD/SUD, and suicidal ideation at T2 or T3 (AORs = 0.72 to 0.85 per standard score increase in unit cohesion; P-values < 0.05). Models of incidence of mental disorders and suicidal ideation among Soldiers without these problems pre-deployment yielded similar results, except that perceived unit cohesion was not associated with incident AUD/SUD.

- Soldiers who reported strong unit cohesion before deployment had lower risk of post-deployment mental disorders and suicidal ideation.

- Awareness of associations of perceived unit cohesion with post-deployment mental health may facilitate targeting of prevention programs.

65. Nicotine Dependence and Pre-Enlistment Suicidal Behavior Among U.S. Army Soldiers (Campbell-Sills, et al 2019)

- This study investigated associations of nicotine dependence with suicidal behaviors among incoming Soldiers. Lifetime DSM-IV nicotine dependence, mental disorders, suicidal behaviors, and their ages of onset were retrospectively assessed in Soldiers entering the Army in 2011−2012.

- Discrete-time survival analysis of person-year data from 30,436 Soldiers was performed to evaluate associations of nicotine dependence with subsequent suicidal ideation, plans, and attempts. Among respondents with lifetime ideation (n=4,060), models tested associations of nicotine dependence with progression from ideation to first onset of plan, from plan to first attempt, and, among ideators without plans, from ideation to first unplanned attempt. A hierarchy of models incorporated increasing controls for other risk factors.

- In models controlling for socio-demographic characteristics, nicotine dependence was associated with onset of all suicidal behaviors (AORs, 2.07−4.08, p <0.001) and with each type of progression of suicidal behavior (AORs, 1.48−2.44, p <0.005). After adjusting for childhood adversities and mental disorders, nicotine dependence remained associated with onset of ideation (AOR=1.27, 95%CI=1.10, 1.46, p=0.001) and attempt (AOR=1.83, 95% CI=1.41, 2.37, p <0.001); and with progression from ideation to unplanned attempt (AOR=2.03, 95% CI=1.17, 1.74, p <0.001).

- Nicotine dependence exhibited associations with onset of suicidal ideation and suicide attempt (and with progression from ideation to unplanned attempt) that were independent of other measured risk factors.

- Awareness of associations of nicotine dependence with suicidal behaviors may inform risk assessment, facilitate targeting of prevention efforts, and provide further impetus for reducing nicotine dependence.

66. Assessment of a Risk Index for Suicide Attempts among U.S. Army Soldiers with Suicide Ideation (Zuromski, et al 2019)

- The Department of Veterans Affairs recently began requiring annual suicide ideation (SI) screening of all patients and additional structured questions for patients reporting SI. Related changes are under consideration at the Department of Defense. These changes will presumably lead to higher SI detection, which will require hiring additional clinical staff and/or developing a clinical decision support system to focus in-depth suicide risk assessments on patients considered high risk.

- This study was designed as a proof-of-concept for whether a brief structured question battery from a survey of Soldiers can help target in-depth suicide risk assessments by identifying Soldiers with self-reported lifetime SI who are at highest risk of subsequent administratively recorded nonfatal suicide attempts (SAs).

- This was a cohort study with prospective observational design involving data collection from May 2011 to February 2013, and participant follow-up through December 2014.

- Analyses included a logistic regression model to assess risk for subsequent administratively recorded nonfatal SAs among a total of 3,649 Soldiers who reported lifetime SI in surveys and were followed-up for 18-45 months from baseline to assess administratively reported nonfatal SAs between survey response and December 2014.

- The 3,649 survey respondents were 80.5% male and had a median (interquartile range) age of 29 (25-36) years (range, 18-55 years); 69.4% were white non-Hispanic, 14.6% were black, 9.0% were Hispanic, 7.0% were another racial/ethnic group.

- Sixty-five respondents had administratively recorded nonfatal SAs between survey response and December 2014. One additional respondent died by suicide without making a nonfatal SA but was excluded from analysis based on previous evidence that predictors are different for suicide death and nonfatal SAs.

- Significant risk factors were SI recency (odds ratio [OR], 7.2; 95% CI, 2.9-18.0) and persistence (OR, 2.6; 95% CI, 1.0-6.8), positive screens for mental disorders (OR, 26.2; 95% CI, 6.1-112.0), and Army career characteristics (OR for junior enlisted rank, 30.0; 95% CI, 3.3-272.5 and OR for senior enlisted rank, 6.7; 95% CI, 0.8-54.9). Cross-validated area under the curve was 0.78. The 10% of respondents with highest estimated risk accounted for 39.2% of subsequent SAs.

- Results suggest the feasibility of developing a clinically useful risk index for SA among Soldiers with SI using a small number of self-report questions. If implemented, a continuous quality improvement approach should be taken to refine the structured question series.

67. Prospective Study of Polygenic Risk, Protective Factors, and Incident Depression following Combat Deployment in US Army Soldiers (Choi, et al 2019)

- This study examined whether trait resilience and/or unit cohesion could protect against the onset of MDD following combat deployment, even in Soldiers at high polygenic risk.

- Study analyzed data from 3,079 Soldiers of European ancestry assessed before and after their deployment to Afghanistan. Incident MDD was defined as no MDD episode at pre-deployment, followed by a MDD episode following deployment.

- Polygenic risk scores were constructed from a large-scale genome-wide association study of major depression. Study first examined the main effects of the MDD PRS and each protective factor on incident MDD. Then study tested the effects of each protective factor on incident MDD across strata of polygenic risk.

- Study found that polygenic risk showed a dose–response relationship to depression, such that Soldiers at high polygenic risk had greatest odds for incident MDD.

- Both unit cohesion and trait resilience were prospectively associated with reduced risk for incident MDD. The protective effect of unit cohesion persisted even in Soldiers at highest polygenic risk.

- Study concluded that polygenic risk was associated with new-onset MDD in deployed Soldiers. Unit cohesion (an index of perceived support and morale) was protective against incident MDD even among those at highest genetic risk, and may represent a potent target for promoting resilience in vulnerable Soldiers.

- Findings illustrate the value of combining genomic and environmental data in a prospective design to identify robust protective factors for mental health.

68. Utilization of and Barriers to Treatment among Suicide Decedents: Results from the Army Study to Assess Risk and Resilience among Servicemembers (Army STARRS) (Zuromski, et al 2019)

- This was a psychological autopsy study that examined suicide decedents' use of mental health treatment and perceived barriers to initiating and maintaining treatment. This study compared suicide decedents (n=135) to Soldiers in two control conditions: those propensity-score-matched on known socio-demographic and Army history variables (n=137) and those with a history of suicidal thoughts in the past 12 months (n=118). Informants were next-of-kin and Army supervisors.

- Study results revealed that suicide decedents were significantly more likely to be referred to services and to use more intensive treatments (e.g., medication, overnight stay in hospital) than propensity-matched controls. Decedents were also more likely to perceive significant barriers to treatment-seeking.

- All differences observed in this study were between propensity-matched controls and decedents, with no observed differences between suicide ideators and decedents.

- The study concluded that many suicide decedents used some form of mental health care at some point in their lives, but they also were more likely than propensity-matched controls to perceive barriers that may have prevented service use.

- The lack of differences between suicide ideators and decedents suggests that more information is needed, beyond knowledge of treatment utilization or perceived barriers, to identify and intervene with those at highest risk for suicide.

- These findings underscore the importance of reducing attitudinal barriers that may deter suicidal Soldiers from seeking treatment, and also improving risk detection among those who are attending treatment.

69. Genome-wide Analyses of Psychological Resilience in U.S. Army Soldiers (Stein, et al 2019)

- There is a growing body of preclinical and translational research illuminating a biological basis for resilience to stress, but little is known about the genetic basis of psychological resilience in humans.

- For this study, genome-wide association studies (GWASs) were conducted of self-assessed (by questionnaire) and outcome-based (incident mental disorders from pre-deployment to post-deployment) resilience among European (EUR) ancestry Soldiers.

- Self-assessed resilience (n=11,492) was found to have significant common-variant heritability and to be significantly negatively genetically correlated with neuroticism.

- GWAS results from the EUR Soldiers revealed a genome-wide significant locus on an intergenic region on Chr 4 upstream from *doublecortin-like kinase 2* (DCLK2) (four single nucleotide polymorphisms (SNPs) in LD; topSNP: rs4260523 is an eQTL in frontal cortex), a member of the doublecortin family of kinases that promote survival and regeneration of injured neurons. A second gene, *kelch-like family member 36* (KLHL36) was detected at gene-wise genome-wide significance. A polygenic risk score derived from the self-assessed resilience GWAS was not significantly associated with outcome-based resilience.

- In very preliminary results, genome-wide significant association with outcome-based resilience was found for one locus (top SNP: rs12580015) on Chr 12 downstream from solute *carrier family 15 member 5* (SLC15A5) in subjects (n=581) exposed to the highest level of deployment stress.

- Further study of genetic determinants of resilience has the potential to illuminate the molecular bases of stress-related psychopathology and point to new avenues for therapeutic intervention.

70. Association of Firearm Ownership, Use, Accessibility, and Storage Practices with Suicide Risk among U.S. Army Soldiers (Dempsey, et al 2019)

- Since 2004, the suicide rate among Army Soldiers has exceeded the rate of death from combat injury. It is critical to establish factors that increase risk of acting on suicidal thoughts to guide early intervention and suicide prevention.

- This study included 135 cases of Army Soldiers who died by suicide while on active duty from Aug 1, 2011 to Nov 1, 2013. Cases were compared with propensity-matched controls and control Soldiers with past year suicidal ideation. Next-of-kin (NOK) and Army supervisors of case and control Soldiers were interviewed. Firearm ownership, storage, and accessibility were assessed using items from the World Health Organization Composite International Diagnostic Interview screening scales along with items created for Army STARRS.

- For the 135 cases, the NOK reported greater accessibility to firearms compared with propensity-matched controls. Specifically, when compared with propensity-matched controls, suicide decedents were:

    - 2 times as likely to own 1 or more handguns
    - 4 times as likely to store a loaded gun at home
    - 3 times as likely to publicly carry a gun when not required for military duty
    - The combination of these 3 items was associated with 3-fold increase in the odds of suicide death

- Storing a loaded gun with ammunition at home or publicly carrying a gun when not on duty was associated with 4-fold increase in odds of suicide death
- In addition to gun ownership, ease and immediacy of firearm access were associated with an increased suicide risk

- The study concluded that discussion with family members and supervisors about limiting firearm accessibility should be evaluated for potential intervention.

71. Associations of Lifetime Traumatic Brain Injury Characteristics With Prospective Suicide Attempt Among Deployed U.S. Army Soldiers (Campbell-Sills, et al 2019)

- This study estimated associations of lifetime traumatic brain injury (TBI) characteristics with prospective suicide attempt among U.S. Army Soldiers. The data were from the Army STARRS Pre/Post Deployment Study that surveyed 3 Brigade Combat Teams that were deployed to Afghanistan in 2012.

- Lifetime TBI and past-month post-concussive/post-TBI symptoms were evaluated at pre-deployment baseline. Recency and number of TBIs were quantified, and TBI severity was classified on the basis of reports of alteration/loss of consciousness and memory lapse. Suicide attempt data came from administrative records and surveys administered after return from deployment.

- Logistic regression models estimated associations of TBI characteristics with prospective suicide attempt among baseline respondents who were deployed (n=7,677), adjusting for other risk factors including lifetime mental disorder. One hundred three Soldiers made a suicide attempt over a median follow-up period of 30 months.

- In the final model estimating joint associations of TBI severity/recency and past-month post-concussive/post-TBI symptoms, only post-concussive/post-TBI symptoms were associated with a higher risk of suicide attempt.

- The study concluded that among the lifetime TBI characteristics evaluated at pre-deployment baseline, only past-month post-concussive/post-TBI symptoms were prospectively associated with an increased risk of suicide attempt following deployment. Detection of post-concussive/post-TBI symptoms could facilitate targeting of Army suicide prevention programs.

72. The Association of Lifetime and Deployment-Acquired Traumatic Brain Injury With Postdeployment Binge and Heavy Drinking (Adams, et al 2019)

- This was a prospective, longitudinal study to investigate associations of lifetime traumatic brain injury (LT-TBI) prior to an index deployment, and/or deployment-acquired TBI (DA-TBI), with post-deployment binge and heavy drinking.

- The study included 4,645 Soldiers from 3 Brigade Combat Teams deployed to Afghanistan in 2012 who participated in the Pre/Post Deployment Study and completed all 4 study assessments: T0 (1-2 months pre-deployment), T1 (upon return to the U.S.), T2 (3 months post-deployment), and T3 (9 months post-deployment).

- The measures included self-reported past month binge drinking (5+ alcoholic beverages on the same day) and past month heavy drinking (binge drinking at least weekly) at T2 and T3. The study controlled for baseline binge drinking.

- In total, 34.3% screened positive for LT-TBI, and 19.2% screened positive for DA-TBI. At T2 only, LT-TBI, but not DA-TBI, was associated with increased odds of binge drinking (adjusted odds ratio [AOR] = 1.39, 95% confidence interval [CI]: 1.20-1.60, P < .001) and heavy drinking (AOR = 1.28, 95% CI: 1.09-1.49, P = .007). Among the subgroup with LT-TBI, also having DA-TBI was associated with increased risk of heavy drinking at T3 (AOR = 1.42, 95% CI: 1.03-1.95, P = .047).

- The study concluded that routine screening for LT-TBI may help target efforts to prevent alcohol misuse among military members.

73. Developing an Optimal Short-Form of the PTSD Checklist for DSM-5 (PCL-5) (Zuromski, et al 2019)

- Although several short-forms of the posttraumatic stress disorder (PTSD) checklist (PCL) exist, all were developed using heuristic methods. This study worked with Army STARRS datasets to create an optimal short-form PCL for DSM-5 (PCL-5) using both machine learning and conventional scale development methods.

- A training dataset (n=8,917) was used to fit short-form scales with 1 to 8 items using different statistical methods (exploratory factor analysis, stepwise logistic regression, and a new machine learning method to find an optimal integer-scored short-form scale) to predict dichotomous PTSD diagnoses that were determined using the full PCL-5.

- A smaller subset of best short-form scales was then evaluated in an independent validation sample (n=11,728) to select one optimal short-form scale based on multiple operating characteristics (area under curve [AUC], calibration, sensitivity, specificity, net benefit).

- Inspection of AUCs in the training sample and replication in the validation sample led to a focus on 4-item integer-scored short-form scales selected with stepwise regression. Brier scores in the validation sample showed that a number of these scales had comparable calibration (0.015–0.032) and AUC (0.984–0.994), but that one had consistently highest net benefit across a plausible range of decision thresholds.

- The study concluded that the recommended 4-item integer-scored short-form PCL-5 generated diagnoses that closely parallel those of the full PCL-5, making it well-suited for screening.

74. Postconcussive, Posttraumatic Stress and Depressive Symptoms in Recently Deployed U.S. Army Soldiers with Traumatic Brain Injury (Agtarap, et al 2019).

- Prior studies raise questions about whether persistent post-concussive symptoms (PCS) are differentiable from mental health sequelae of traumatic brain injury (TBI). Using data from the Army STARRS Pre/Post Deployment Study that surveyed 3 Brigade Combat Teams that were deployed to Afghanistan in 2012, this study evaluated the structure of post-concussive, posttraumatic stress, and depressive symptoms following TBI, to investigate whether PCS represented a distinct symptom domain.

- Data from 1,229 participants who sustained probable TBI during deployment completed ratings of past-30-day post-concussive, posttraumatic stress, and depressive symptoms three months after return from deployment. Exploratory factor analysis (EFA; n=300) and confirmatory factor analysis (CFA; n=929) of symptom ratings were performed in independent subsamples.

- EFA suggested a model with three correlated factors resembling PCS, posttraumatic stress, and depression. CFA confirmed adequate fit of the 3-factor model (CFI=.964, RMSEA=.073 [.070-.075]), contingent upon allowing theoretically defensible cross-loadings.

- Bifactor CFA indicated that variance in all symptoms was explained by a general factor but also provided evidence of domain factors defined by: (1) re-experiencing/hyperarousal, (2) cognitive/somatic symptoms, and (3) depressed mood/anhedonia.

- Soldiers with more severe TBI had higher cognitive/somatic scores, while Soldiers with more deployment stress had higher general and re-experiencing/hyperarousal scores. The variance in PCS was attributable to both a specific cognitive/somatic symptom factor and a general factor that also explained variance in posttraumatic stress and depression.

- Measurement of specific domains representing cognitive/somatic symptoms, re-experiencing/hyperarousal, and depressed mood/anhedonia may help clarify the relative severity of PCS, posttraumatic stress, and depression among individuals with recent TBI.

75. Early First Deployment and Risk of Suicide Attempt Among First-term Enlisted Soldiers in the U.S. Army (Naifeh, et al 2019)

- The study examined early first deployment and subsequent suicide attempt among U.S. Army Soldiers using 2004–2009 administrative data and person-month records of first term, Regular Army, enlisted Soldiers with one deployment (89.2% male). The study identified 1,704 Soldiers with a documented suicide attempt during or after first deployment and an equal-probability control sample (n = 25,861 person-months).

- Logistic regression analyses indicated Soldiers deployed within the first 12 months of service were more likely than later deployers to attempt suicide (OR = 1.7 [95% CI = 1.5–1.8]). Adjusting for sociodemographic characteristics, service-related characteristics, and previous mental health diagnosis slightly attenuated this association (OR = 1.6 [95% CI = 1.5–1.8]). Results were not modified by gender, deployment status, military occupation, or mental health diagnosis.

- The population-attributable risk proportion for deploying within the first 12 months of service was 17.8%. Linear spline models indicated similar risk patterns over time for early and later deployers, peaking at month 9 during deployment and month 5 post-deployment; however, monthly suicide attempt rates were consistently higher for early deployers.

- The study concluded that enlisted Soldiers deployed within the first 12 months of service had elevated risk of suicide attempt during and after first deployment. Improved understanding of why early deployment increases risk can inform the development of policies and intervention programs.

76. Risk Factors and Timing of Suicide Attempts among US Army Reserve Component Soldiers during Deployment to the Afghanistan and Iraq Wars (Stokes, et al 2019)

- During the wars in Afghanistan and Iraq, suicidal behaviors increased among U.S. Army Soldiers. Although Reserve Component (RC) Soldiers (National Guard and Army Reserve) comprise approximately one third of those deployed in support of the wars, few studies have examined suicidal behaviors among these “citizen-soldiers.” The objective of the study was to examine suicide attempt risk factors and timing among RC enlisted Soldiers.

- This longitudinal, retrospective cohort study used individual-level person-month records from Army and Department of Defense administrative data systems to examine socio-demographic, service-related, and mental health predictors of medically documented suicide attempts among enlisted RC Soldiers during deployment from 2004–2009. Data were analyzed using discrete-time survival models. A total of 230 enlisted RC Soldiers attempted suicide.

- Overall, the in-theater suicide attempt rate among RC Soldiers was 81/100,000 person-years. Risk was highest in the fifth month of deployment (13.8 per 100,000 person-months). Suicide attempts were more likely among Soldiers who were women (adjusted

odds ratio, aOR = 2.5 [95% CI: 1.8–3.5]), less than high school educated (aOR = 1.8 [95% CI: 1.3–2.5]), in their first 2 years of service (aOR = 2.0 [95% CI: 1.2–3.4]), were currently married (aOR = 2.0 [95% CI: 1.5–2.7]), and had received a mental health diagnosis in the previous month (aOR = 24.7 [95% CI: 17.4–35.0]).

- The study concluded that being female, early in service and currently married are associated with increased odds of suicide attempt in RC soldiers. Risk of suicide attempt was greatest at mid deployment. These predictors and the timing of suicide attempt for RC Soldiers in-theater are largely consistent with those of deployed Active Component (Regular) Soldiers. Results also reinforce and replicate the findings among Active Component Soldiers related to the importance of a recent mental health diagnosis and the mid-deployment as a period of enhanced risk.

77. Economic Evaluation of Brief Cognitive Behavioral Therapy vs Treatment as Usual for Suicidal US Army Soldiers (Bernecker, et al 2019)

- Brief cognitive behavioral therapy (BCBT) is a clinically effective intervention for reducing risk of suicide attempts among suicidal Army Soldiers. Because specialized treatments can be resource intensive, more information is needed on costs and benefits of BCBT compared with existing treatments. This study was designed to evaluate the cost-effectiveness of BCBT compared with treatment as usual for suicidal Army Soldiers.

- This study used a decision analytic model to compare effects and costs of BCBT vs treatment as usual. Input data were drawn from epidemiologic data sets and a clinical trial of suicidal Soldiers. The study compared treatment as usual alone versus treatment as usual plus 12 individual BCBT sessions. Treatment as usual could include a range of pharmacologic and psychological treatment options.

- BCBT was expected to avert about 23-25 more suicide attempts and 1-3 more suicide deaths per 100 patients treated than treatment as usual. Sensitivity analyses showed BCBT to be cost saving in most scenarios. Using the federal discount rate, the DoD was estimated to save $15,000-$16,630 per patient with BCBT vs treatment as usual. In a worst-case scenario (i.e., assuming the weakest plausible BCBT effect sizes), BCBT cost an additional $1,910 to $2,250 per patient compared with treatment as usual.

- Results suggest BCBT may be a cost-saving intervention for suicidal active-duty Soldiers. The costs of ensuring treatment fidelity would also need to be considered when assessing the implications of disseminating BCBT across the entire DoD.

78. Pre-deployment predictors of suicide attempt during and after combat deployment (Zurmoski, et al 2019)

- Deployment-related experiences might be risk factors for Soldier suicides in which case identification of vulnerable Soldiers before deployment could inform preventive efforts.

This study investigated this possibility by using pre-deployment survey and administrative data in a sample of US Army Soldiers to develop a risk model for suicide attempt (SA) during and shortly after deployment.

- Soldiers in the Pre-Post Deployment Survey (PPDS) completed a baseline survey shortly before deploying to Afghanistan in 2011–2012. Survey measures were used to predict SAs, defined using administrative and subsequent survey data, through 30 months after deployment. Models were built using penalized regression and ensemble machine learning methods.

- Significant pre-deployment risk factors were history of traumatic brain injury, 9+ mental health treatment visits in the 12 months before deployment, young age, female, previously married, and low relationship quality. Cross-validated AUC of the best penalized and ensemble models were .75–.77.

- 21.3–40.4% of SAs occurred among the 5–10% of Soldiers with highest predicted risk and positive predictive value (PPV) among these high-risk Soldiers was 4.4–5.7%.

- Study concluded that SA can be predicted significantly from pre-deployment data, but intervention planning needs to take PPV into consideration.

79. Genome-wide association study of shared liability to anxiety disorders (Hettema, et al 2019)

- Anxiety disorders (ANX), namely generalized anxiety, panic disorder, and phobias, are common, etiologically complex syndromes that show increasing prevalence and comorbidity throughout adolescence and beyond. Few genome-wide association studies (GWAS) examining ANX risk have been published and almost exclusively in individuals of European ancestry.

- In this study, participants were phenotyped to approximate DSM-based ANX diagnoses and each subject was factor-analyzed to create a single dimensional anxiety score. GWAS were conducted using that score within each of three ancestral groups (EUR, AFR, LAT) and then meta-analyzed across ancestries (N Total = 16,510).

- The study sought to (a) replicate prior ANX GWAS findings in ANGST; (b) determine whether results extended to other ancestry groups; and (c) meta-analyze with ANGST for increased power to identify novel susceptibility loci.

- No reliable genome-wide significant SNP associations were detected. However, SNPs within the CAMKMT gene located in region 2p21 associated with shared ANX risk in ANGST were replicated in EUR Soldiers but not in other ancestry groups.

- Combining EUR STARRS and ANGST (N = 28,950) yielded a more robust 2p21 association signal ($p = 9.08x10{-}11$). Gene-based analyses supported three genes within

2p21 and LBX1 on chromosome 10. More powerful ANX genetic studies will be required to identify further loci.

80. Factors associated with suicide ideation in US Army soldiers during deployment in Afghanistan (Ursano, et al 2020)

- This study was designed to better understand suicide ideation (SI) during combat deployment to help inform prevention and treatment during and after deployment. The study examined associations of sociodemographic characteristics, lifetime and past-year stressors, and mental disorders with 30-day SI among a representative sample of US Army Soldiers deployed in Afghanistan.

- Soldiers who were deployed to Afghanistan completed self-administered questionnaires and the sample was weighted to represent all 87,032 Soldiers serving in Afghanistan. Prevalence of lifetime, past-year, and 30-day SI and mental disorders was determined and logistic regression analyses was used to examine risk factors associated with SI. The study assessed SI, lifetime and 12-month stressors, and mental disorders using questionnaires. Administrative records identified sociodemographic characteristics and suicide attempts.

- A total of 3,957 Soldiers (3,473 [weighted 87.5%] male; 2,135 [weighted 52.6%] aged 29 years) completed self-administered questionnaires during their deployment in Afghanistan. Lifetime, past-year, and 30-day SI prevalence estimates were 11.7%, 3.0%, and 1.9%, respectively. Among Soldiers with SI, 44.2% had major depressive disorder (MDD) and 19.3% had PTSD in the past 30-day period.

- A series of analyses of the 23 grouped variables potentially associated with SI resulted in a final model of sex; race/ethnicity; lifetime noncombat trauma; past 12-month relationship problems, legal problems, and death or illness of a friend or family member; and MDD. In this final multivariable model, white race/ethnicity, lifetime noncombat trauma, and MDD were associated with SI. Among the 85 Soldiers with past 30-day SI, from survey administration through 12 months after returning from deployment, 6% (5 participants) had a documented suicide attempt vs 0.14% (6 participants) of the 3,872 Soldiers without SI.

- This study suggests that major depressive disorder and noncombat trauma are important factors in identifying SI risk during combat deployment.

81. Self-injurious thoughts and behaviors that differentiate soldiers who attempt suicide from those with recent suicide ideation (Naifeh, et al 2020)

- Because risk for suicide attempt (SA) versus suicide ideation (SI) is clinically important and difficult to differentiate, this study examined whether a history of self-injurious thoughts and behaviors (SITBs) differentiates Soldiers with a recent SA from non-attempting Soldiers with current or recent SI.

- This study used a unique case-control design and administered the same questionnaire (assessing the history of SITBs and psychosocial variables) to representative Soldiers recently hospitalized for SA (n = 132) and Soldiers from the same Army installations who reported 30-day SI but did not make an attempt (n = 125). Logistic regression analyses examined whether SITBs differentiated attempters and ideators after controlling for previously identified covariates.

- In separate models that weighted for systematic non-response and controlled for gender, education, post-traumatic stress disorder, and intermittent explosive disorder, SA was positively and significantly associated with the history of suicide plan and/or intention to act, difficulty controlling suicidal thoughts during the worst week of ideation, and non-suicidal self-injury (NSSI). Area under the curve was 0.87 in a full model that combined these SITBs and covariates. The top ventile based on predicted risk had a sensitivity of 24.7%, specificity of 99.8%, and positive predictive value of 97.5%.

- The study concluded that history of suicide plan/intention, difficult to control ideation, and NSSI differentiate Soldiers with recent SA from those with current/recent SI independent of sociodemographic characteristics and mental disorders. Longitudinal research is needed to determine whether these factors are prospectively associated with the short-term transition from SI to SA.

82. Unit cohesion during deployment and post-deployment mental health: is cohesion an individual- or unit-level buffer for combat-exposed soldiers? (Campbell-Sills, et al 2020)

- Unit cohesion may protect Soldier mental health by mitigating effects of combat exposure, but questions remain about the origins of potential stress-buffering effects.

- This study examined buffering effects associated with two forms of unit cohesion (peer-oriented horizontal cohesion and subordinate-leader vertical cohesion) defined as either individual-level or aggregated unit-level variables.

- Using mixed-effects regression, the study analyzed longitudinal survey data from Soldiers who deployed to Afghanistan in 2012. Models evaluated individual- and unit-level interaction effects of combat exposure and cohesion during deployment on symptoms of post-traumatic stress disorder (PTSD), depression, and suicidal ideation reported at 3 months post-deployment (model n's = 6684 to 6826). Given the small effective sample size (k = 89), the significance of unit-level interactions was evaluated at a 90% confidence level.

- The study found, at the individual-level, buffering effects of horizontal cohesion for PTSD symptoms and depressive symptoms, while a buffering effect of vertical cohesion was observed for PTSD symptoms only.

- At the unit-level, buffering effects of horizontal (but not vertical) cohesion were observed for PTSD symptoms, depressive symptoms, and suicidal ideation.

- The study concluded that policies and interventions that enhance horizontal cohesion may protect combat-exposed units against post-deployment mental health problems. Efforts to support individual Soldiers who report low levels of horizontal or vertical cohesion may also yield mental health benefits.

83. A test of the interpersonal theory of suicide in a large, representative, retrospective and prospective study (Chu, et al 2020)

- The interpersonal theory of suicide hypothesizes that perceived burdensomeness, thwarted belongingness, and hopelessness lead to active suicidal thoughts and individuals with active suicidal thoughts and elevated capability for suicide are most likely to attempt suicide.

- This study retrospectively and prospectively tested this theory in a large sample of 7,677 Soldiers who were followed post-deployment for up to nine months.

- The study found that interaction of perceived burdensomeness and hopelessness (OR = 2.59) was significantly associated with lifetime suicidal thoughts, and the interactions of thwarted belongingness and perceived burdensomeness and of thwarted belongingness and hopelessness were not.

- The study also found that, consistent with the theory, capability for suicide prospectively predicted suicide attempts during and following deployment (OR = 1.22). However, among Soldiers reporting lifetime suicidal thoughts, capability did not predict attempts, only perceived burdensomeness did (OR = 1.36).

- Study results supported some, but not all, theory hypotheses, suggesting that additional constructs may be needed to better identify the psychological factors that lead Soldiers to attempt suicide.

84. Association between neurocognitive functioning and suicide attempts in US Army Soldiers (Hoffman, et al 2020)

- This study sought to discover objective predictors of suicide and non-fatal suicidal behaviors by examining the association between neurocognitive functioning and pre-military history of suicide attempts (SA) and post-enlistment onset of SA.

- The study included 38,507 new Soldiers reporting for Basic Combat Training who completed a comprehensive computerized neurocognitive assessment battery and self-report questionnaires. A subset of Soldiers (n=6,216) completed a follow-up survey, including assessment of lifetime SA, 3–7 years later.

- Six hundred eighty-nine Soldiers indicated lifetime SA at baseline and 210 Soldiers indicated new-onset SA at follow-up. Regression analyses, adjusted for demographic variables, revealed significant bivariate associations between neurocognitive performance on measures of sustained attention, impulsivity, working memory, and emotion recognition and lifetime SA at baseline.

- In a multivariable model including each of these measures as predictors, poorer impulse control and quicker response times on an emotion recognition measure were significantly and independently associated with increased odds of lifetime SA. A second model predicted new-onset SA at follow-up for Soldiers who did not indicate a history of SA at baseline. Poorer impulse control on a measure of sustained attention was predictive of new-onset SA. Effect sizes were small and of unlikely clinical predictive utility.

- The study simultaneously examined multiple neurocognitive domains as predictors of SA in a large, representative sample of new Army Soldiers. The study found that impulsivity most strongly predicted past and future SA over and beyond other implicated cognitive-emotional domains.

85. Sex differences in US Army suicide attempts during the wars in Iraq and Afghanistan (Naifeh, et al 2021)

- This study examined sex differences in risk for administratively documented suicide attempt (SA) among US Army Soldiers during the Iraq/Afghanistan wars using administrative person-month records of Regular Army enlisted Soldiers from 2004 to 2009. The study identified 9,650 person-months with a first documented SA and an equal-probability control sample (n=153,528 person-months). Person-months were weighted to the population and pooled over time.

- After examining the association of sex with SA in a logistic regression analysis, predictors were examined separately among women and men. The study found that women (an estimated 13.7% of the population) accounted for 25.2% of SAs and were more likely than men to attempt suicide after adjusting for sociodemographic, service-related, and mental health diagnosis (MHDx) variables. Women with increased odds of SA in a given person-month were younger, non-Hispanic White, less educated, in their first term of enlistment, never or previously deployed (vs. currently deployed), and previously received a MHDx.

- Interactions indicated significant but generally small differences between women and men on 6 of the 8 predictors, the most pronounced being time in service, deployment status, and MHDx. Discrete-time survival models were used to examine risk by time in service and demonstrated that patterns for women and men were similar, and that women's initially higher risk diminished as time in service increased.

- The study concluded that predictors of documented SAs are similar for US Army women and men. Differences associated with time in service, deployment status, and MHDx require additional research. Future research should consider stressors that disproportionately affect women.

86. Risk of suicide attempt in reserve versus active component soldiers during deployment to the wars in Iraq and Afghanistan (Naifeh, et al 2021)

- Little is known about the degree to which Army Soldiers in the Reserve Components (Army National Guard and Army Reserve) and Active Component (Regular Army) differ with respect to suicide attempt (SA) risk during high-stress times, such as deployment.

- This study used administrative person-month records of enlisted Soldiers on active duty during 2004 to 2009 to identify 1,170 Soldiers with a medically-documented SA during deployment and an equal-probability control sample of other deployed Soldiers (n = 52,828 person-months).

- Logistic regression analyses were used to examine the association of Army component (Guard/Reserve vs. Regular) with SA before and after adjusting for socio-demographic and service-related predictors.

- Guard/Reserve comprised 32.1% of enlisted Soldiers and 19.7% of suicide attempters in-theater, with a SA rate of 81/100,000 person-years (vs. 157/100,000 person-years among Regular; rate ratio = 0.5 [95% CI = 0.5–0.6]). Risk peaked near mid-deployment for both groups but was consistently lower for Guard/Reserve throughout deployment. Guard/Reserve had lower odds of SA after adjusting for covariates (OR = 0.7 [95%CI = 0.6–0.8]). Predictors of SA were similar between components.

- The study concluded that Guard/Reserve and Regular Soldiers had similar patterns and predictors of SA during deployment, but Guard/Reserve had lower risk, even after controlling for important risk factors. The authors stated that additional research is needed to understand the lower SA risk among Guard/Reserve in-theater.

87. Dissecting the heterogeneity of posttraumatic stress disorder: differences in polygenic risk, stress exposures, and course of PTSD subtypes (Campbell-Sills, et al 2021)

- Definition of disorder subtypes may facilitate precision treatment for post-traumatic stress disorder (PTSD). This study aimed to identify PTSD subtypes and evaluate their associations with genetic risk factors, types of stress exposures, comorbidity, and course of PTSD.

- The data came from a prospective study of three U.S. Army Brigade Combat Teams that deployed to Afghanistan in 2012. Soldiers with probable PTSD (PTSD Checklist

for Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition ≥31) at three months post-deployment comprised the sample (n = 423) for latent profile analysis using Gaussian mixture modeling and PTSD symptom ratings as indicators. PTSD profiles were compared on polygenic risk scores (derived from external genomewide association study summary statistics), experiences during deployment, comorbidity at three months post-deployment, and persistence of PTSD at nine months post-deployment.

- Latent profile analysis revealed profiles characterized by prominent intrusions, avoidance, and hyperarousal (threat-reactivity profile; n = 129), anhedonia and negative affect (dysphoric profile; n = 195), and high levels of all PTSD symptoms (high-symptom profile; n = 99). The threat-reactivity profile had the most combat exposure and the least comorbidity. The dysphoric profile had the highest polygenic risk for major depression, and more personal life stress and co-occurring major depression than the threat-reactivity profile. The high-symptom profile had the highest rates of concurrent mental disorders and persistence of PTSD.

- The study concluded that genetic and trauma-related factors likely contribute to PTSD heterogeneity, which can be parsed into subtypes that differ in symptom expression, comorbidity, and course. Future studies should evaluate whether PTSD typology modifies treatment response and should clarify distinctions between the dysphoric profile and depressive disorders.

88. Social closeness and support are associated with lower risk of suicide among U.S. Army Soldiers (Dempsey, et al 2021)

- This case-control study tested the aspects of social support, unit cohesion, and religiosity hypothesized to be protective factors for suicide among U.S. Service members.

- The study compared U.S. Army Soldiers who died by suicide while on active duty (n = 135) to two types of controls: controls propensity score-matched on known sociodemographic risk factors (n = 128); and controls who had thought about, but did not die by, suicide in the past year (n = 108). Data collection included structured interviews with next-of-kin (NOK) and Army supervisors (SUP) for each case Soldier and each control Soldier. Logistic regression analyses were used to examine predictors of suicide.

- The study found that perceived social closeness and seeking help from others were associated with decreased odds of suicide, as reported by SUP (OR = 0.2 [95% CI = 0.1, 0.5]) and NOK (OR = 0.4 [95% CI = 0.2, 0.8]). Novel reports by SUP informants of high levels of unit cohesion/morale decreased odds of suicide (OR = 0.1 [95% CI = 0.0, 0.2]). Contrary to study hypotheses, no religious affiliation was associated with lower odds of suicide (OR = 0.3 [95% CI = 0.2, 0.6]).

- The study concluded that perceived social closeness and unit/group cohesion are associated with lower odds of suicide. These results point toward social intervention strategies as testable components of suicide prevention programs.

89. Polygenic risk for major depression is associated with lifetime suicide attempt in U.S. Soldiers independent of personal and parental history of major depression (Stein, et al 2021)

- Suicide is a major public health problem. The contribution of common genetic variants for major depressive disorder (MDD) independent of personal and parental history of MDD has not been established.

- This study calculated polygenic risk score (using PRS-CS) for MDD for U.S. Army Soldiers of European ancestry. The study then tested associations between polygenic risk for MDD and lifetime suicide attempt (SA) in models that also included parental or personal history of MDD. Models were adjusted for age, sex, tranche (where applicable), and 10 principal components reflecting ancestry.

- In the first cohort, 417 (6.3%) of 6,573 Soldiers reported a lifetime history of SA. In a multivariable model that included personal (OR = 3.83, 95% CI:3.09–4.75) and parental history of MDD (OR = 1.43, 95% CI:1.13–1.82 for one parent and OR = 1.64, 95% CI:1.20–2.26 for both parents), MDD PRS was significantly associated with SA (OR = 1.22, 95% CI:1.10–1.36).

- In the second cohort, 204 (4.2%) of 4,900 Soldiers reported a lifetime history of SA. In a multivariable model that included personal (OR = 3.82, 95% CI:2.77–5.26) and parental history of MDD (OR = 1.42, 95% CI:0.996–2.03 for one parent and OR = 2.21, 95% CI:1.33–3.69 for both parents) MDD PRS continued to be associated (at p = .0601) with SA (OR = 1.15, 95% CI:0.994–1.33).

- The study concluded that a Soldier's PRS for MDD conveys information about likelihood of a lifetime SA beyond that conveyed by two predictors readily obtainable by interview: personal or parental history of MDD. Results remain to be extended to prospective prediction of incident SA. These findings portend a role for PRS in risk stratification for suicide attempts.

90. Predictors of suicide attempt within 30 days after first medically documented suicidal ideation in U.S. Army Soldiers (Mash, et al 2021)*

- This study was designed to identify predictors of imminent suicide attempt (within 30 days) among U.S. Army Soldiers following their first documented suicidal ideation.

- From 2006-2009 Army/DoD administrative data, the authors identified 11,178 active-duty Regular Army enlisted Soldiers with medically documented suicidal ideation and no prior medically documented suicide attempts. The study examined risk factors for suicide attempt within 30 days of first suicidal ideation using logistic regression analyses, including sociodemographic and service-related characteristics, psychiatric diagnoses, physical health care visits, injuries, and history of family violence or crime perpetration or victimization.

- The study found that among Soldiers with first documented suicidal ideation, 830 (7.4%) attempted suicide, 46.3% of whom (n = 387) attempted suicide within 30 days (rate, 35.4 per 1,000 Soldiers). Following a series of multivariate analyses, the final model identified females (odds ratio51.3, 95% CI51.0, 1.8), combat medics (odds ratio51.6, 95% CI51.1, 2.2), individuals with an anxiety disorder diagnosis prior to suicidal ideation (odds ratio = 1.3, 95% CI = 1.0, 1.6), and those who received a sleep disorder diagnosis on the same day as the recorded suicidal ideation (odds ratio = 2.3, 95% CI = 1.1, 4.6) as being more likely to attempt suicide within 30 days. Black Soldiers (odds ratio = 0.6, 95% CI = 0.4, 0.9) and those who received an anxiety disorder diagnosis on the same day as suicidal ideation (odds ratio = 0.7, 95% CI = 0.5, 0.9) were less likely.

- The study concluded that suicide attempt risk is highest in the first 30 days following ideation diagnosis and is more likely among women, combat medics, and Soldiers with an anxiety disorder diagnosis before suicidal ideation and a same-day sleep disorder diagnosis. Black Soldiers and those with a same-day anxiety disorder diagnosis were at decreased risk. These factors may help identify Soldiers at imminent risk of suicide attempt.

91. Pre-enlistment anger attacks and post-enlistment mental disorders and suicidality among U.S. Army Soldiers (Smith, et al 2021)

- This study was designed to explore the associations of pre-enlistment anger attacks with post-enlistment mental health. The study included a cohort of new Soldiers surveyed at 3 Army installations when they entered basic training from April 2011 to November 2012, with a subsample who completed a follow-up survey conducted from September 2016 to April 2018.

- History of anger attacks at baseline survey was used to classify new Soldiers as having non-impairing anger attacks (>2 attacks without interference in work or personal life), impairing anger attacks (>2 attacks with interference in work or personal life), or no significant history of anger attacks.

- Baseline analyses examined sociodemographic and clinical correlates of a history of anger attacks. Prospective logistic regression models estimated associations of baseline history of anger attacks with new onset and persistence of posttraumatic stress disorder, major depressive disorder (MDD), generalized anxiety disorder (GAD), panic disorder, mania/hypomania, substance use disorder, suicidal ideation, and suicide attempt at follow-up.

- Of the 38 507 baseline participants (83.0% male and 17.0% female; mean [SD] age, 20.97 [3.57] years), 6,216 were selected for and completed the follow-up survey. Baseline prevalence (SE) of non-impairing and impairing anger attacks was 8.83% (0.16%) and 5.75% (0.15%), respectively. Prospective models showed that impairing anger attacks were associated with new onset of MDD (adjusted odds ratio [AOR], 1.98; 95% CI, 1.31-2.99), GAD (AOR, 2.39; 95% CI, 1.66-3.45), panic disorder (AOR, 2.02; 95% CI, 1.34-3.05), and suicidal ideation (AOR, 2.11; 95% CI, 1.45-3.07). When baseline psychiatric comorbidity was controlled for, impairing attacks remained associated with onset of GAD (AOR, 1.75; 95% CI, 1.19-2.58) and suicidal ideation (AOR, 1.62; 95% CI, 1.09-2.42). Anger attacks were not significantly associated with persistence of pre-enlistment mental disorders.

- The findings from this study suggest that a pre-enlistment history of impairing anger attacks may be associated with elevated risk of developing GAD, MDD, and suicidality after enlistment. Detection of impairing anger attacks could aid in assessing psychiatric risk in new Soldiers.

92. Mental disorders, gun ownership, and gun carrying among Soldiers after leaving the Army, 2016-2019 (Bossarte, et al 2021)

- This study was designed to examine associations of current mental and substance use disorders with self-reported gun ownership and carrying among recently separated Army soldiers. Veterans have high rates of both gun ownership and mental disorders, the conjunction of which might contribute to the high suicide rate in this group.

- Cross-sectional survey data were collected in 2018–2019 from 5,682 recently separated Soldiers who participated in the Army Study to Assess Risk and Resilience in Servicemembers. Validated measures assessed recent mood, anxiety, substance use, and externalizing disorders. Logistic regression models examined associations of sociodemographic characteristics, service characteristics, and mental disorders with gun ownership and carrying.

- Of the participants, 50% reported gun ownership. About half of owners reported carrying some or most of the time. Mental disorders were not associated significantly with gun ownership. However, among gun owners, major depressive disorder, panic disorder, posttraumatic stress disorder, and intermittent explosive disorder were associated with significantly elevated odds of carrying at least some of the time.

- The study concluded that mental disorders are not associated with gun ownership among recently separated Army personnel, but some mental disorders are associated with carrying among gun owners.

93. Association between responsibility for the death of others and postdeployment mental health and functioning in U.S. Soldiers (Khan, et al 2021)

- Rates of suicidal thoughts and behaviors (STBs) in Soldiers have increased sharply since the terrorist attacks on September 11, 2001, and postdeployment posttraumatic stress disorder (PTSD) remains a concern. Studies show that Soldiers with greater combat exposure are at an increased risk for adverse mental health outcomes, but little research has been conducted on the specific exposure of responsibility for the death of others.

- This study was designed to examine the association between responsibility for the death of others in combat and mental health outcomes among active-duty Soldiers at 2-3 months and 8-9 months postdeployment.

- The study obtained data from a prospective 4-wave survey of 3 Army brigade combat teams that deployed to Afghanistan in 2012. The sample was restricted to Soldiers with data at all 4 waves (1-2 months predeployment, and 2-3 weeks, 2-3 months, and 8-9 months postdeployment).

- Primary outcomes were past-30-day PTSD, major depressive episode, STBs, and functional impairment at 2-3 vs 8-9 months postdeployment. Combat exposures were assessed using a combat stress scale. The association of responsibility for the death of others during combat was tested using separate multivariable logistic regression models per outcome adjusted for age, sex, race and ethnicity, marital status, brigade combat team, predeployment lifetime internalizing and externalizing disorders, and combat stress severity. A total of 4,645 Soldiers (mean [SD] age, 26.27 [6.07] years; 4358 men [94.0%]) were included in this study.

- After returning from Afghanistan, 22.8% of Soldiers (n = 1,057) reported responsibility for the death of others in combat. This responsibility was not associated with any outcome at 2-3 months postdeployment (PTSD odds ratio [OR]: 1.23 [95% CI, 0.93-1.63]; P = .14; STB OR: 1.19 [95% CI, 0.84-1.68]; P = .33; major depressive episode OR: 1.03 [95% CI, 0.73-1.45]; P = .87; and functional impairment OR: 1.12 [95% CI, 0.94-1.34]; P = .19).

- However, responsibility was associated with increased risk for PTSD (OR, 1.42; 95% CI, 1.09-1.86; P = .01) and STBs (OR, 1.55; 95% CI, 1.03-2.33; P = .04) at 8-9 months postdeployment. Responsibility was not associated with major depressive episode (OR, 1.30; 95% CI, 0.93-1.81; P = .13) or functional impairment (OR, 1.13; 95% CI, 0.94-1.36; P = .19).

- When examining enemy combatant death only, the pattern of results was unchanged for PTSD (OR, 1.44; 95 CI%, 1.10-1.90; P = .009) and attenuated for STBs (OR, 1.46; 95 CI%, 0.97- 2.20; P = .07).

- This cohort study found there was an association between being responsible for the death of others in combat and PTSD and STB at 8-9 months, but not 2-3 months, postdeployment in active-duty Soldiers. The results suggest that delivering early intervention to those who report such responsibility may mitigate the subsequent occurrence of PTSD and STBs.

94. Effects of prior deployments and perceived resilience on anger trajectories of combat-deployed Soldiers (Campbell-Sills, et al 2021)

- Problematic anger is frequently reported by Soldiers who have deployed to combat zones. However, evidence is lacking with respect to how anger changes over a deployment cycle, and which factors prospectively influence change in anger among combat-deployed Soldiers.

- Reports of problematic anger were obtained from 7,298 Army Soldiers who deployed to Afghanistan in 2012. A series of mixed-effects growth models estimated linear trajectories of anger over a period of 1–2 months before deployment to 9 months post-deployment, and evaluated the effects of pre-deployment factors (prior deployments and perceived resilience) on average levels and growth of problematic anger.

- A model with random intercepts and slopes provided the best fit, indicating heterogeneity in Soldiers' levels and trajectories of anger. First-time deployers reported the lowest anger overall, but the most growth in anger over time. Soldiers with multiple prior deployments displayed the highest anger overall, which remained relatively stable over time.

- Higher pre-deployment resilience was associated with lower reports of anger, but its protective effect diminished over time. First- and second-time deployers reporting low resilience displayed different anger trajectories (stable versus decreasing, respectively).

- The study concluded that change in anger from pre- to post-deployment varies based on pre-deployment factors. The observed differences in anger trajectories suggest that efforts to detect and reduce problematic anger should be tailored for first-time versus repeat deployers. Ongoing screening is needed even for Soldiers reporting high resilience before deployment, as the protective effect of pre-deployment resilience on anger erodes over time.

95. Association of emotion reactivity and distress intolerance with suicide attempts in U.S. Army Soldiers (Naifeh, et al 2021)

- This study was designed to assess whether emotion reactivity (ER) and distress intolerance (DI) were associated with increased suicide attempt (SA) risk among Army Soldiers.

- In this case–control study, 74 Soldiers recently hospitalized for SA (cases) were compared with 133 control Soldiers from the same Army installations selected based on either propensity score matching (n=103) or reported 12-month suicide ideation (SI) (n=30). Controls were weighted to represent the total Army population at the study sites and the subpopulation of 12-month ideators.

- Participants completed questionnaires assessing ER, DI, and other psychosocial variables. Logistic regression analyses examined whether ER and DI differentiated SA cases from the general population and from 12-month ideators before and after controlling for additional important risk factors (sociodemographic characteristics, stressors, mental disorders).

- In univariate analyses, ER differentiated SA cases from both the general population (OR = 2.5 [95%CI = 1.7–3.6]) and Soldiers with 12-month SI (OR = 2.5 [95%CI = 1.3–4.6]). DI also differentiated cases from the general population (OR = 2.9 [95%CI = 2.0–4.1]) and 12-month ideators (OR = 1.9 [95%CI = 1.1–3.5]). These associations persisted after controlling for sociodemographic variables, stressors, and mental disorders.

- The study concluded that the findings provide evidence that higher ER and DI are associated with increased risk of SA among Soldiers, even after adjusting for known risk factors. Prospective research with larger samples is needed.

96. Predicting suicide attempts among U.S. Army Soldiers after leaving active duty using information available before leaving active duty (Stanley, et al 2022)

- Suicide risk is elevated among military service members who recently transitioned to civilian life. Identifying high-risk service members before this transition could facilitate provision of targeted preventive interventions. This study investigated the feasibility of doing this by attempting to develop a prediction model for self-reported suicide attempts (SAs) after leaving or being released from active duty in the Study to Assess Risk and Resilience in Servicemembers-Longitudinal Study (STARRS-LS).

- The study included two self-report panel surveys (LS1: 2016–2018, LS2: 2018–2019) administered to respondents who previously participated while on active duty in one of three Army STARRS 2011–2014 baseline self-report surveys.

- The focus was on respondents who left active duty >12 months before their LS survey (n = 8,899). An ensemble machine learning model using predictors available prior to leaving active duty was developed in a 70% training sample and validated in a 30% test sample.

- The 12-month self-reported SA prevalence (SE) was 1.0% (0.1). Test sample AUC (SE) was 0.74 (0.06). The 15% of respondents with highest predicted risk included nearly two-thirds of 12-month SAs and over 80% of medically serious 12-month SAs.

- These results show that it is possible to identify soldiers at high post-transition self-report SA risk before the transition. Future model development is needed to examine prediction of SAs assessed by administrative data and using surveys administered closer to the time of leaving active duty.

97. Predicting homelessness among U.S. Army Soldiers no longer on active duty (Koh, et al 2022)

- The ability to predict and prevent homelessness has been an elusive goal. The purpose of this study was to develop a prediction model that identified U.S. Army Soldiers at high risk of becoming homeless after transitioning to civilian life based on information available before the time of this transition.

- The prospective cohort study consisted of observations from 16,589 Soldiers who were separated or deactivated from service and who had previously participated in 1 of 3 baseline surveys of the Army Study to Assess Risk and Resilience in Servicemembers in 2011−2014.

- A machine learning model was developed in a 70% training sample and evaluated in the remaining 30% test sample to predict self-reported homelessness in 1 of 2 longitudinal study surveys administered in 2016−2018 and 2018−2019. Predictors included survey, administrative, and geospatial variables available before separation/deactivation.

- The study found that the 12-month prevalence of homelessness was 2.9% (SE=0.2%) in the total longitudinal study sample. The area under the receiver operating characteristic curve in the test sample was 0.78 (SE=0.02) for homelessness. The 4 highest ventiles (top 20%) of predicted risk included 61% of respondents with homelessness. Self-reported lifetime histories of depression, trauma of having a loved one murdered, and post-traumatic stress disorder were the 3 strongest predictors of homelessness.

- The study concluded that a prediction model for homelessness can accurately target Soldiers for preventive intervention before transition to civilian life.

98. Associations of vulnerability to stressful life events with suicide attempts after active duty among high-risk Soldiers (Chu, et al 2022)

- The transition from military service to civilian life is a high-risk period for suicide attempts (SAs). Although stressful life events (SLEs) faced by transitioning Soldiers are thought to be implicated, systematic prospective evidence is lacking.

- Participants in the Army Study to Assess Risk and Resilience in Servicemembers (STARRS) completed baseline self-report surveys while on active duty in 2011–2014. Two self-report follow-up longitudinal surveys (LS1: 2016–2018; LS2: 2018–2019) were subsequently administered to probability subsamples of these baseline respondents.

- As detailed in a previous report, a SA risk index based on survey, administrative, and geospatial data collected before separation/deactivation identified 15% of the LS respondents who had separated/deactivated as being high-risk for self-reported post-separation/deactivation SAs. The current report presents an investigation of the extent to which self-reported SLEs occurring in the 12 months before each LS survey might have mediated/modified the association between this SA risk index and post-separation/deactivation SAs.

- The study found that the 15% of respondents identified as high-risk had a significantly elevated prevalence of some post-separation/deactivation SLEs. In addition, the associations of some SLEs with SAs were significantly stronger among predicted high-risk than lower-risk respondents. Demographic rate decomposition showed that 59.5% (S.E. = 10.2) of the overall association between the predicted high-risk index and subsequent SAs was linked to these SLEs.

- The study concluded that it might be possible to prevent a substantial proportion of post-separation/deactivation SAs by providing high-risk Soldiers with targeted preventive interventions for exposure/vulnerability to commonly occurring SLEs.

99. Association of pre-military mental health with suicide attempts during U.S. Army service (Naifeh, et al 2022)

- Approximately one-third of U.S. Soldiers who attempt suicide have not received a mental health diagnosis (MH-Dx) before their suicide attempt (SA), yet little is known about risk factors for SA in those with no MH-Dx. This study examined whether pre-military mental health is associated with medically documented SA among U.S. Army Soldiers who do not receive an MH-Dx before their SA.

- This cohort study used data from a representative survey of Soldiers in the U.S. Army entering basic combat training from April 1, 2011 to November 30, 2012, who were followed up via administrative records for the first 48 months of service. Regular Army enlisted Soldiers (n = 21,772) recruited from 3 U.S. Army installations during the first week of service who agreed to have their administrative records linked to their survey responses were included in this study.

- Pre-enlistment lifetime history of mental disorder, suicide ideation, SA, and non-suicidal self-injury (NSSI) were reported during the baseline survey. Service-acquired MH-Dx and sociodemographic and service-related variables were identified using administrative records. Documented SAs were identified using administrative medical records.

- The study used a discrete-time survival framework, and linear splines to examine the pattern of SA risk over the first 48 months of service. Logistic regression analysis examined associations of lifetime baseline survey variables with subsequent, medically documented SA among Soldiers who did vs did not receive an MH-Dx during service. Models were adjusted for time in service and sociodemographic and service-related variables.

- The study found that of the 21,722 respondents (86.2% male, 20.4% Black, 61.8% White non-Hispanic), 253 made an SA in the first 48 months of service (male [75.4%]; Black [22.7%], White non-Hispanic [59.9%], or other race or ethnicity [17.4%]). The risk of SA peaked toward the end of the first year of service for both those who did and did not receive an MH-Dx during service.

- Of the 42.3% of individuals reporting at least 1 of the 4 baseline risk factors, 50.2% received an administrative MH-Dx during service vs 41.5% of those with none, and 1.6% had a documented SA vs 1.0% of those with none. Among individuals with no MH-Dx, medically documented SAs were associated with suicide ideation (odds ratio [OR], 2.2; 95% CI, 1.1-4.4), SA (OR, 11.3; 95% CI, 4.3-29.2), and NSSI (OR, 3.0; 95% CI, 1.3-6.8). For those who received an MH-Dx, medically documented SAs were associated with mental disorder (OR, 1.4; 95% CI, 1.0-1.9), SA (OR, 3.4; 95% CI, 2.1-5.6), and NSSI (OR, 1.8; 95% CI, 1.1-2.8). Interactions indicated the only explanatory variable that differed based on history of MH-Dx was pre-enlistment SA (χ 2 = 4.7; P = .03), which had a larger OR among Soldiers with no MH-Dx than among those with an MH-Dx.

- In this study, the period of greatest SA risk and baseline risk factors for SA were similar in Soldiers with and without an MH-Dx. This finding suggests that knowledge of the time course and pre-enlistment mental health factors can equally aid in identifying SA risk in Soldiers who do and do not receive an MH-Dx.

100. Prospective associations of military discharge characterization with post-active duty suicide attempts and homelessness (Naifeh, et al 2022)

- Active duty service members transitioning to civilian life can experience significant re-adjustment stressors. Over the past two decades of the United States' longest sustained conflict, reducing transitioning veterans' suicidal behavior and homelessness became national priorities. However, it remains a significant challenge to identify which service members are at greatest risk of these post-active duty outcomes. Discharge characterization, which indicates the quality of an individual's military service and affects eligibility for benefits and services at the Department of Veterans Affairs, is a potentially important indicator of risk.

- This study used data from two self-report panel surveys of STARRS-LS which were administered (2016-2019) to respondents who previously participated while on active duty in one of the three Army STARRS baseline self-report surveys (2011-2014): the New Soldier Study (NSS), a survey of soldiers entering basic training; All Army Study, a survey of active duty soldiers around the world; and the Pre-Post Deployment Study, a survey of soldiers before and after combat deployment.

- This study used modified Poisson regression models to prospectively examine the association of discharge characterization (honorable, general, "bad paper" [other than honorable, bad conduct, dishonorable], and uncharacterized [due to separation within the first 180 days of service]) with suicide attempt (subsample of n=4,334 observations) and homelessness (subsample of n=6,837 observations) among those no longer on active duty (i.e., separated or deactivated). Analyses controlled for other suicide attempt and homelessness risk factors using standardized risk indices that were previously developed using the STARRS-LS survey data.

- The study found that the twelve-month prevalence rates of self-reported suicide attempts and homelessness in the total pooled sample were 1.0% and 2.9%, respectively. While not associated with suicide attempt risk, discharge characterization was associated with homelessness after controlling for other risk factors.

- Compared to soldiers with an honorable discharge, those with a bad paper discharge had an increased risk of homelessness in the total sample (relative risk [RR]=4.4 [95% CI=2.3-8.4]), as well as within subsamples defined by which baseline survey respondents completed (NSS vs. All Army Study/Pre-Post Deployment Study), whether respondents had been separated (vs. deactivated), and how much time had elapsed since respondents were last on active duty.

- The study concluded that there is a robust association between receiving a bad paper discharge and post-separation/deactivation homelessness. Policies that enhance transition assistance and access to mental healthcare for high-risk soldiers may aid in reducing post-separation/deactivation homelessness among those who do not receive an honorable discharge.

101. Social network size and personality traits independently and prospectively predict distress disorders and suicidal behavior in U.S. Army soldiers (Taylor, et al 2022)

- Personality traits (e.g., neuroticism) and the social environment predict risk for internalizing disorders and suicidal behavior. Studying these characteristics together and prospectively within a population confronted with high stressor exposure (e.g., U.S. Army soldiers) has not been done, yet could uncover unique and interactive predictive effects that may inform prevention and early intervention efforts.

- This study assessed five broad personality traits and social network size via self-administered questionnaires among experienced soldiers preparing for deployment (n=4,645) and new soldiers reporting for basic training (n=6,216). Using predictive models, the study examined associations of baseline personality and social network variables with recent distress disorders or suicidal behaviors assessed 3- and 9-months post-deployment and approximately 5 years following enlistment.

- The study found among the personality traits, elevated neuroticism was consistently associated with increased mental health risk following deployment. Small social networks were also associated with increased mental health risk following deployment, beyond the variance accounted for by personality. Limited support was found for social network size moderating the association between personality and mental health outcomes. Small social networks also predicted distress disorders and suicidal behavior 5 years following enlistment, whereas unique effects of personality traits on these more distal outcomes were rare.

- The study concluded that heightened neuroticism and small social networks predict a greater risk for negative mental health sequelae, especially following deployment. Social ties may mitigate adverse impacts of personality traits on psychopathology in some contexts. Early identification and targeted intervention for these distinct, modifiable factors may decrease the risk of distress disorders and suicidal behavior.

102. Prospective associations of emotion reactivity and risk behaviors with suicide attempts in U.S. Army soldiers (Naifeh, et al 2022)

- Emotion reactivity and risk behaviors (ERRB) are transdiagnostic dimensions associated with suicide attempt (SA). ERRB patterns may identify individuals at increased risk of future SAs.

- For this study, a representative sample of U.S. Army Soldiers entering basic combat training (n=21,772) was surveyed and followed via administrative records for their first 48 months of service. Latent profile analysis of baseline survey items assessing ERRB dimensions, including emotion reactivity, impulsivity, and risk-taking behaviors, identified distinct response patterns (classes). SAs were identified using administrative medical records.

- A discrete-time survival framework was used to examine associations of ERRB classes with subsequent SA during the first 48 months of service, adjusting for time in service, socio-demographic and service-related variables, and mental health diagnosis (MH-Dx). The study examined whether associations of ERRB classes with SA differed by year of service and for soldiers with and without a MH-Dx.

- Of the 21,772 respondents (86.2% male, 61.8% White non-Hispanic), 253 made a SA. Four ERRB classes were identified: 'Indirect Harming' (8.9% of soldiers), 'Impulsive' (19.3%), 'Risk-Taking' (16.3%), and 'Low ERRB' (55.6%). Compared to Low ERRB, Impulsive [OR 1.8 (95% CI 1.3–2.4)] and Risk-Taking [OR 1.6 (95% CI 1.1–2.2)] had higher odds of SA after adjusting for covariates. The ERRB class and MH-Dx interaction was non-significant. Within each class, SA risk varied across service time.

- The study concluded that SA risk within the four identified ERRB classes varied across service time. Impulsive and Risk-Taking soldiers had increased risk of future SA. MH-Dx did not modify these associations, which may therefore help identify risk in those not yet receiving mental healthcare.

103. Recent stressful experiences and suicide risk: implications for suicide prevention and intervention in U.S. Army soldiers (Dempsey, et al 2023)

- This study was designed to identify the extent to which the presence of recent stressful events are risk factors for suicide among active-duty soldiers as reported by informants.

- The study participants included next-of-kin (NOK) and Army supervisors (SUP) of active duty soldiers (n=135) who died by suicide and two groups of living controls: propensity-matched soldiers (n=128) and soldiers who reported suicidal ideation (SI) in the past year but did not die (n=108). The data analyzed were collected from participants via structured interviews. Multivariate logistic regression analyses were used to create a risk score for suicide.

- The odds of suicide increased significantly for soldiers experiencing relationship problems, military punishment, and perceived failure or humiliation in the month prior to death. Suicide risk models with these risk factors predicted suicide death among those who reported SI in the past year (OR = 5.9, [95% CI = 1.5, 24.0] $\chi 2 = 6.24$, p = 0.0125, AUC, 0.73 (0.7, 0.8) NOK) and (OR = 8.6, [95% CI = 1.4, 51.5] $\chi 2 = 5.49$, p = 0.0191, AUC, 0.78 (0.7, 0.8); SUP) suggesting the combination of these recent stressors may contribute to the transition from ideation to action.

- The study findings suggest for the first time recent stressors distinguished suicide ideating controls from suicide decedents in the month prior to death as reported by informants. Implications for preventive intervention efforts for clinicians, supervisors and family members in identifying the transition from ideation to action are discussed.

104. Exposure to bullying or hazing during deployment and mental health outcomes among U.S. Army soldiers (Campbell-Sills, et al 2023)

- Workplace bullying is associated with mental disorders and suicidality in civilians, but few studies have examined associations of bullying with these outcomes among military personnel. This study was designed to evaluate associations of being bullied or hazed during deployment with major depressive disorder (MDD), intermittent explosive disorder, posttraumatic stress disorder (PTSD), suicidal ideation, and substance use disorder (SUD).

- This cohort study used data from the Army STARRS New Soldier Study (NSS; April 1, 2011,to November 30, 2012) and wave 1 of the STARRS Longitudinal Study (STARRS-LS; September 1, 2016, to April 30, 2018). A computerized survey administered at 3 U.S. Army installations (NSS) and a web/telephone survey (STARRS-LS wave 1) were used to collect the data.

- Data were analyzed from October 11, 2021 to October 28, 2022. STARRS-LS wave 1 participants were comprised of a probability sample of active-duty soldiers and veterans who had participated in Army STARRS baseline surveys while on active duty (weighted response rate, 35.6%). Respondents whose baseline was the NSS and who had deployed to a combat theater at least once were eligible for this study.

- The exposure was being bullied or hazed during a combat deployment. The primary outcomes were MDD, intermittent explosive disorder, PTSD, and suicidal ideation in the 12 months before STARRS-LS wave 1 and SUD in the 30 days before STARRS-LS wave 1, assessed with items from the Composite International Diagnostic Interview Screening Scales, PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, and Columbia-Suicide Severity Rating Scale. Logistic regression was used to estimate associations of bullying or hazing exposure with the outcomes.

- The 1,463 participants were predominantly male (weighted percentage [SE], 90.4% [0.9%]) and had a mean (SE) age of 21.1 (0.1) years at baseline. At STARRS-LS wave 1, 188 respondents (weighted percentage [SE], 12.2% [1.1%]) reported bullying or hazing during deployment. Weighted outcome prevalences were 18.7% (1.3%) for MDD, 5.2% (0.9%) for intermittent explosive disorder, 21.8% (1.5%) for PTSD, 14.2% (1.2%) for suicidal ideation, and 8.7% (1.0%) for SUD.

- In models that adjusted for baseline sociodemographic and clinical characteristics and other potential traumas, exposure to bullying or hazing was significantly associated with MDD (adjusted odds ratio [aOR], 2.92; 95% CI, 1.74-4.88), intermittent explosive disorder (aOR, 2.59; 95% CI, 1.20-5.59), PTSD (aOR, 1.86; 95% CI, 1.23-2.83), suicidal ideation (aOR, 1.91; 95% CI, 1.17-3.13), and SUD (aOR, 2.06; 95% CI, 1.15-3.70).

- The study concluded that in this cohort study of combat-deployed soldiers, reports of being bullied or hazed during deployment were associated with mental disorders and suicidal thoughts. Recognition of these associations may inform efforts to prevent and address mental health problems among service members.

105. Stressful life events and risk of homelessness after active duty: an assessment of risk and resilience among service members (Montgomery, et al 2023)

- The transition from military to civilian life may present increased exposure to various stressful life events (SLEs) that can increase the risk of homelessness (e.g., loss of employment, dissolution of romantic relationships). This study assessed the extent to which exposure to SLEs occurring proximal to U.S. Army soldier transitions out of active duty was associated with risk of homelessness.

- The study included a total of 16,589 respondents who were no longer on active duty but participated while on active duty in 2011-2014 baseline surveys and completed follow-up surveys in 2016-2018 and 2018-2019. The follow-up surveys assessed SLEs and homelessness occurring in the past 12 months. The study used modified Poisson regression models to evaluate how much differential SLE exposure and effects explained the aggregate association of a risk index with homelessness among a sample of 6,837 respondents, weighted to represent the full sample.

- The study found that more than half (n=3,510, 52.8%) of respondents reported experiencing any SLEs in the past 12 months. Most (60.5%) of the difference in prevalence of homelessness among respondents defined as being at high risk of homelessness (vs lower risk) was explained by differential exposure to, and/or effects of, these SLEs. Personal betrayal by a loved one and economic problems played the largest roles in adjusted risk differences (0.045 and 0.074, respectively).

- The study concluded that homelessness might be reduced by gearing interventions toward soldiers at high risk of homelessness who are transitioning out of active duty to reduce exposure to and effects of modifiable SLEs on experiencing homelessness.

106. Associations of polygenic risk scores with posttraumatic stress symptom trajectories following combat deployment (Campbell-Sills, et al 2023)

- Identification of genetic risk factors may inform the prevention and treatment of posttraumatic stress disorder (PTSD). This study evaluates the associations of polygenic risk scores (PRS) with patterns of posttraumatic stress symptoms following combat deployment.

- U.S. Army soldiers of European ancestry (n=4,900) provided genomic data and ratings of posttraumatic stress symptoms before and after deployment to Afghanistan in 2012. Latent growth mixture modeling was used to model posttraumatic stress symptom trajectories among participants who provided post-deployment data (n=4,353). Multinomial logistic regression models tested independent associations between trajectory membership and PRS for PTSD, major depressive disorder (MDD), schizophrenia, neuroticism, alcohol use disorder, and suicide attempt, controlling for age, sex, ancestry, and exposure to potentially traumatic events, and weighted to account for uncertainty in trajectory classification and missing data.

- Participants were classified into low-severity (77.2%), increasing-severity (10.5%), decreasing-severity (8.0%), and high-severity (4.3%) posttraumatic stress symptom trajectories. Standardized PTSD-PRS and MDD-PRS were associated with greater odds of membership in the high-severity v. low-severity trajectory [adjusted odds ratios and 95% confidence intervals, 1.23 (1.06–1.43) and 1.18 (1.02–1.37), respectively] and the increasing-severity v. low-severity trajectory [1.12 (1.01–1.25) and 1.16 (1.04–1.28), respectively]. Additionally, MDD-PRS was associated with greater odds of membership in the decreasing-severity v. low-severity trajectory [1.16 (1.03–1.31)]. No other associations were statistically significant.

- The study concluded that higher polygenic risk for PTSD or MDD is associated with more severe post-traumatic stress symptom trajectories following combat deployment. PRS may help stratify at-risk individuals, enabling more precise targeting of treatment and prevention programs.

107. A practical risk calculator for suicidal behavior among transitioning U.S. Army Soldiers (Kearns, et al 2023)

- Risk of suicide-related behaviors is elevated among military personnel transitioning to civilian life. An earlier report showed that high-risk U.S. Army soldiers could be identified shortly before this transition with a machine learning model that included predictors from administrative systems, self-report surveys, and geospatial data. Based

on this result, a Veterans Affairs and Army initiative was launched to evaluate a suicide-prevention intervention for high-risk transitioning soldiers. To make targeting practical, a streamlined model and risk calculator were needed that used only a short series of self-report survey questions.

- This study revised the original model in a sample of n=8,335 STARRS-LS participants who participated in one of three Army STARRS 2011-2014 baseline surveys while in service, and in one or more subsequent panel surveys (STARRS-LS wave 1: 2016-2018, STARRS-LS wave 2: 2018-2019) after leaving service. The study trained ensemble machine learning models with constrained numbers of item-level survey predictors in a 70% training sample. The outcome was self-reported post-transition suicide attempts (SA). The models were validated in the 30% test sample.

- The study found that twelve-month post-transition SA prevalence was 1.0% (SE=0.1). The best constrained model, with only 17 predictors, had a test sample ROC-AUC of 0.85 (SE=.03). The 10-30% of respondents with the highest predicted risk included 44.9-92.5% of 12-month SAs.

- The study concluded that an accurate SA risk calculator based on a short self-report survey can target transitioning soldiers shortly before leaving service for intervention to prevent post-transition SA.

108. Genetic, environmental and behavioral correlates of lifetime suicide attempt: Analysis of additive and interactive effects in two cohorts of U.S. Army Soldiers (Campbell-Sills, et al 2023)

- This study calculated a polygenic risk score for suicide attempt (SA-PRS) for Soldiers of European ancestry who participated in the Army STARRS New Soldier Study (NSS; n = 6,573) or Pre/Post Deployment Study (PPDS; n = 4,900). Multivariable logistic regression models were fit within each sample to estimate the association of SA-PRS with lifetime suicide attempt (LSA), and to examine whether SA-PRS displayed additive or interactive effects with environmental and behavioral risk/protective factors (lifetime trauma burden, childhood maltreatment, negative urgency impulsivity, social network size, perceived mattering, and dispositional optimism). Age, sex, and within-ancestry variation were included as covariates.

- Observed prevalence of LSA was 6.3% and 4.2% in the NSS and PPDS samples, respectively. In the NSS model, SA-PRS and environmental/behavioral factors displayed strictly additive effects on odds of LSA.

- Results indicated an estimated 21% increase in odds of LSA per 1 SD increase in SA-PRS [adjusted odds ratio (AOR; 95% CI) = 1.21 (1.09–1.35)]. In PPDS, the effect of SA-PRS varied by reports of optimism [AOR = 0.85 (0.74–0.98) for SA-PRS x optimism effect]. Individuals reporting low and average optimism had 37% and 16%

increased odds of LSA per 1 SD increase in SA-PRS, respectively, whereas SA-PRS was not associated with LSA in those reporting high optimism.

- Overall, results suggested the SA-PRS had predictive value over and above several environmental and behavioral risk factors for LSA. Moreover, elevated SA-PRS may be more concerning in the presence of environmental and behavioral risk factors (e.g., high trauma burden; low optimism). Given the relatively small effect magnitudes, the cost and incremental benefits of utilizing SA-PRS for risk targeting must also be considered in future work.

109. Predictors of suicide attempt within 30 days of first medically documented major depression diagnosis in U.S. Army Soldiers with no prior suicidal ideation (Mash, et al 2023)

- Understanding mental health predictors of imminent suicide attempt (SA; within 30 days) among Soldiers with depression and no prior suicide ideation (SI) can inform prevention and treatment. This case-control study aimed to identify sociodemographic and service-related characteristics and mental disorder predictors associated with imminent SA among U.S. Army Soldiers following first documented major depression diagnosis (MDD) with no history of SI.

- The study used STARRS administrative data to identify 101,046 active-duty Regular Army enlisted Soldiers (2010–2016) with medically-documented MDD and no prior SI (MDD/No-SI). The study examined risk factors for SA within 30 days of first MDD/No-SI using logistic regression analyses, including socio-demographic/service-related characteristics and psychiatric diagnoses.

- The 101,046 Soldiers with documented MDD/No-SI were primarily male (78.0%), < 29 years old (63.9%), White (58.1%), high school-educated (74.5%), currently married (62.0%) and < 21 when first entering the Army (56.9%). Among Soldiers with MDD/No-SI, 2,600 (2.6%) subsequently attempted suicide, 16.2% (n = 421) within 30 days (rate: 416.6/100,000).

- The final multivariable model identified: Soldiers with less than high school education ($\chi 23 = 11.21$, OR = 1.5[95%CI = 1.2–1.9]); combat medics ($\chi 22 = 8.95$, OR = 1.5[95%CI = 1.1–2.2]); bipolar disorder (OR = 3.1[95%CI = 1.5–6.3]), traumatic stress (i.e., acute reaction to stress/not PTSD; OR = 2.6[95%CI = 1.4–4.8]), and "other" diagnosis (e.g., unspecified mental disorder: OR = 5.5[95%CI = 3.8-8.0]) diagnosed same day as MDD; and those with alcohol use disorder (OR = 1.4[95%CI = 1.0-1.8]) and somatoform/dissociative disorders (OR = 1.7[95%CI = 1.0- 2.8]) diagnosed before MDD were more likely to attempt suicide within 30 days.

- Currently married Soldiers ($\chi 22 = 6.68$, OR = 0.7[95%CI = 0.6–0.9]), those in service 10+ years ($\chi 23 = 10.06$, OR = 0.4[95%CI = 0.2–0.7]), and a sleep disorder diagnosed same day as MDD (OR = 0.3[95%CI = 0.1–0.9]) were less likely.

- The study concluded that SA risk within 30 days following first MDD is more likely among Soldiers with less education, combat medics, and bipolar disorder, traumatic stress, and "other" disorder the same day as MDD, and alcohol use disorder and somatoform/dissociative disorders before MDD. These factors identify imminent SA risk and can be indicators for early intervention.

110. Toward personalized care for insomnia in the U.S. Army: Development of a machine learning model to predict response to pharmacotherapy (Gabbay, et al 2023)

- Insomnia is highly prevalent among US Army soldiers, especially those with combat exposure. This study developed a machine-learning model to predict responses to pharmacologic treatment for insomnia using a battery of administrative variables available for all soldiers.

- The sample in this study consisted of 4,738 non-deployed US Army soldiers treated with insomnia medication and followed 6–12 weeks after initiating treatment. All patients had moderate–severe baseline scores on the Insomnia Severity Index (ISI) and completed 1 or more follow-up ISIs 6–12 weeks after baseline. An ensemble machine-learning model was developed in a 70% training sample to predict clinically significant ISI improvement.

- 21.3% of patients had clinically significant ISI improvement. Among the 30% of patients with the highest predicted probabilities of improvement, 32.5% had clinically significant symptom improvement vs. 16.6% in the 70% sample predicted to be least likely to improve ($x2\ 1 = 37.1$, $P < .001$).

- This study concluded that more severe baseline insomnia was associated with increased probability of symptom improvement, while older age and psychiatric and physical comorbidities were associated with decreased probability of improvement.

111. Development and validation of a machine learning prediction model of posttraumatic stress disorder after military deployment (Papini, et al 2023)

- Military deployment involves significant risk for life-threatening experiences that can lead to posttraumatic stress disorder (PTSD). This study developed and validated a machine learning (ML) model to predict postdeployment PTSD using self-reported predictors collected before deployment.

- This study included 4771 soldiers from 3 US Army brigade combat teams. Predeployment assessments occurred 1 to 2 months before deployment to Afghanistan, and follow-up assessments occurred approximately 3 and 9 months post deployment.

- Machine learning models to predict postdeployment PTSD were developed in the first 2 recruited cohorts using as many as 801 predeployment predictors from comprehensive self-report assessments. The optimal model showed good performance in a temporally and geographically distinct validation sample.

- The results from the model indicate that predeployment stratification of PTSD risk is feasible and may facilitate the development of targeted prevention and early intervention strategies.

112. Associations of active-duty mental health trajectories with post-military adjustment: Results from the STARRS Longitudinal Study (Campbell-Sills, et al 2023)

- Many service members experience difficulties transitioning from military to civilian life. This study examined whether changes in mental health observed during active duty were associated with indices of post-military adjustment.

- Survey data from the multi-wave Army STARRS Pre/Post Deployment Study (PPDS; conducted 2012–2014) were linked to follow-up data from wave 1 of the STARRS Longitudinal Study (STARRS-LS1; conducted 2016–2018).

- Empirical Bayes estimates of intercepts and slopes of posttraumatic stress, problematic anger, and depressive symptoms during the PPDS were extracted from mixed-effects growth models and evaluated as predictors of life stress among 1080 participants who had separated or retired from the Army at STARRS-LS1; and of job satisfaction among 586 veterans who were employed at STARRS-LS1.

- Higher average levels and larger increases in posttraumatic stress, anger, and depression over the deployment period were each associated with increased stress and (in the case of anger and depression) reduced job satisfaction.

- Larger increases in posttraumatic stress and anger over a deployment period were associated with increased stress after leaving the Army, even after controlling for average symptom levels during the same period. Monitoring changes in mental health during active duty may help identify personnel who need additional support to facilitate the military-to-civilian transition.

113. Optimism, Sociability, and the Risk of Future Suicide Attempt among U.S. Army Soldiers (Naifeh, et al 2023)

- This study used two components of the Army Study to Assess Risk and Resilience in Servicemembers to examine the association of personality facets from the Tailored Adaptive Personality Assessment System, a computerized instrument administered prior to entering service, with medically documented suicide attempts during service. Of particular importance is identifying risk factors for the 1/3 of suicide attempters who never receive a mental health diagnosis (MH-Dx)-and therefore are not identified as having a mental health problem in the military healthcare system-prior to their suicide attempt.

- A 2010-2016 sample of historical administrative records from U.S. Regular Army enlisted soldiers with complete data on 11 commonly administered Tailored Adaptive Personality Assessment System facets was examined using a series of logistic regression analyses to identify the facets associated with future suicide attempt.

- Analysis of the historical administrative data (87.0% male, 61.6% White non-Hispanic), found that low Optimism (odds ratio (OR) = 1.2 [95% CI = 1.0-1.4]) and high/low (vs. moderate) Sociability (OR = 1.3 [95%CI = 1.1-1.6]) were associated with suicide attempt after adjusting for other univariable-significant facets and socio-demographic and service-related variables. When examined in the longitudinal survey cohort, low Optimism (OR = 1.7 [95% CI = 1.1-2.4]) and high/low (vs. moderate) Sociability (OR = 1.7 [95% CI = 1.1-2.5]) were still associated with increased odds of documented suicide attempt during service, even after adjusting for each other, socio-demographic and service-related variables, and medically documented MH-Dx. Mental health diagnosis had a significant two-way interaction with Optimism ($F = 5.27$, $p = 0.0236$) but not Sociability.

- Optimism and Sociability, assessed prior to entering U.S. Army service, are consistently associated with future suicide attempt during service, even after adjusting for other important risk factors. While Sociability is equally associated with suicide attempt among those with and without a MH-Dx, Optimism is specifically associated with suicide attempt among soldiers not identified in the mental healthcare system.

114. Prospective association of attachment style with suicide attempts among U.S. Army soldiers (Naifeh, et al 2023)

- A representative sample of US Army soldiers entering service (n = 21,772) was surveyed and followed via administrative records for their first 48 months of service to examine if attachment styles are prospectively associated with medically documented Suicide Attempts (SA).

- Administrative medical records identified SAs. Discrete-time survival analysis examined associations of attachment style with future SA during service, adjusting for time in service, socio-demographics, service-related variables, and mental health diagnosis (MH-Dx). This study examined whether associations of attachment style with SA differed based on sex and MH-Dx.

- Endorsed attachment styles included secure (46.8%), preoccupied (9.1%), fearful (15.7%), and dismissing (19.2%). Examined separately, insecure attachment styles were associated with increased odds of SA: preoccupied [OR 2.5 (95% CI 1.7-3.4)], fearful [OR 1.6 (95% CI 1.1-2.3)], dismissing [OR 1.8 (95% CI 1.3-2.6)]. Examining attachment styles simultaneously along with other covariates, preoccupied [OR 1.9 (95% CI 1.4-2.7)] and dismissing [OR 1.7 (95% CI 1.2-2.4)] remained significant.

- The dismissing attachment and MH-Dx interaction was significant. In stratified analyses, dismissing attachment was associated with SA only among soldiers without MH-Dx. Other interactions were non-significant. Soldiers endorsing any insecure attachment style had elevated SA risk across the first 48 months in service, particularly during the first 12 months.

- Insecure attachment styles, particularly preoccupied and dismissing, are associated with increased future SA risk among soldiers. Elevated risk is most substantial during first year of service but persists through the first 48 months. Dismissing attachment may indicate risk specifically among soldiers not identified by the mental healthcare system.

115. Uncommon Protein-Coding Variants Associated With Suicide Attempt in a Diverse Sample of U.S. Army Soldiers (Wilkerson, et al 2023)

- This study attempts to advance the search for genetic risk by analyzing the association between suicide attempt and uncommon variation exome-wide in a large, ancestrally diverse sample.

- Study sequenced whole genomes of 13,584 soldiers from the Army STARRS (Army Study to Assess Risk and Resilience in Servicemembers), including 979 individuals with a history of suicide attempt.

- 19 genes were identified with variants enriched in individuals with history of suicide attempt. Most genes had variants across multiple genomic ancestry groups and were expressed in healthy brain tissue.

- Several genes, both novel and overlapping with known S-MDD regions, were associated with SA. These results advance the molecular characterization of suicide attempt behavior and support the utility of whole-genome sequencing for complementing the findings of genome-wide association studies in suicide research.

116. Perspectives of suicide loss survivors: Qualitative analysis of data from a psychological autopsy study of U.S. Army soldiers (Zuromski, et al 2024)

- This study analyzed interview data from suicide loss survivors collected as part of a psychological autopsy study of U.S. Army soldiers.

- Next-of-kin (NOK) (n=61) and Army supervisors (SUP) (n=107) of suicide decedents (n=135) who had died in the last 2–3 months answered open ended questions about suicide risk factors, ideas for improving suicide prevention, and the impact of the suicide.

- The most common idea regarding suicide prevention from SUP was that the suicide was inevitable, whereas NOK were more likely to emphasize the importance of increasing mental health treatment and reducing stigma. Both NOK and SUP reported negative effects of the suicide, but SUP reported some positive effects (e.g., increased unit connectedness).

- Findings highlight attitudinal barriers present in the military that, if targeted, may increase soldiers' help-seeking and willingness to disclose their risk.

117. Polygenic risk for suicide attempt is associated with lifetime suicide attempt in US soldiers independent of parental risk (Stein, et al 2024)

- This study used summary statistics from the largest available GWAS study of Suicide Attempt (SA) to generate SA-PRS for two non-overlapping cohorts of soldiers of European ancestry to examine polygenic risk for SA.

- In a multivariable model that included parental history of MDD and parental history of SA, SA-PRS remained significantly associated with lifetime SA [aOR = 1.26, 95%CI:1.13–1.39, $p < 0.001$] per standardized unit SA-PRS]. In the second cohort, 204 (4.2 %) of 4900 soldiers reported lifetime SA, and 299 (6.1 %) reported lifetime Non-Suicidal Self-Injury (NSSI)

- In this study of two non-overlapping cohorts of United States Army soldiers, and in the combined sample, we found polygenic risk for suicide attempt (SA-PRS) was associated with lifetime risk of suicide attempt (SA) as determined from a combination of self-report and Army medical records.

118. Interactive effects of genetic liability and combat exposure on risk of alcohol use disorder among US service members (Campbell-Sills, et al 2024)

- This study examined whether the relationship between a service-related risk factor (combat exposure) and later alcohol use disorder (AUD) varied based on individual differences in genetic liability to AUD.

- The sample consisted of 1203 US Army soldiers of genetically determined European ancestry who provided survey and genomic data in the Army STARRS Pre/Post Deployment Study (PPDS; 2012-2014) and follow-up survey data in wave 1 of the STARRS Longitudinal Study (2016-2018). Logistic regression was used to estimate the conditional effect of combat exposure level (self-reported in PPDS) on odds of probable AUD diagnosis at follow-up, as a function of a soldier's polygenic risk score (PRS) for AUD.

- Findings indicate that higher combat exposure was more strongly associated with elevated AUD risk among soldiers with heightened genetic liability to AUD.

119. Predicting Suicides Among US Army Soldiers After Leaving Active Service (Kennedy, et al 2024)

- The suicide rate of military servicemembers increases sharply after returning to civilian life. This study aimed to develop a model based on administrative data for regular US Army soldiers that can predict suicides 1 to 120 months after leaving active service.

- In this prognostic study, a consolidated administrative database was created for all regular US Army soldiers who left service from 2010 through 2019. Machine learning models were trained to predict suicides over the next 1 to 120 months in a random 70% training sample.

- Predictors came from administrative records available before leaving service on sociodemographics, Army career characteristics, psychopathologic risk factors, indicators of physical health, social networks and supports, and stressors.

- Results of this study demonstrated that a model based on administrative variables available at the time of leaving active Army service can predict suicides with meaningful accuracy over the subsequent decade. However, final determination of cost-effectiveness would require information beyond the scope of this report about intervention content, costs, and effects over relevant horizons in relation to the monetary value placed on preventing suicides.

120. A prediction model for differential resilience to the effects of combat-related stressors in US army soldiers (Kessler, et al 2024)

- This study developed a composite score for differential resilience to effects of combat-related stressors (CRS) on persistent DSM-IV post-traumatic stress disorder (PTSD) among US Army combat arms soldiers using survey data collected before deployment.

- A sample of n = 2542 US Army combat arms soldiers completed a survey shortly before deployment to Afghanistan and then again two to three and 8– 9 months after redeployment. Retrospective self-reports were obtained about CRS. Precision treatment methods were used to determine whether differential resilience to persistent PTSD in the follow-up surveys could be developed from pre- deployment survey data in a 60% training sample and validated in a 40% test sample.

- 40.8% of respondents experienced high CRS and 5.4% developed persistent PTSD. Significant test sample heterogeneity was found in resilience ($t = 2.1$, $p = 0.032$), with average treatment effect (ATE) of high CRS in the 20% least resilient soldiers of 17.1% (SE = 5.5%) compared to ATE = 3.8% (SE = 1.2%) in the remaining 80%. The most important predictors involved recent and lifetime pre- deployment distress disorders.

- A reliable pre-deployment resilience score can be constructed to predict variation in the effects of high CRS on persistent PTSD among combat arms soldiers. Such a score could be used to target preventive interventions to reduce PTSD or other resilience-related outcomes.

121. Predicting suicide attempts among US Army soldiers using information available at the time of periodic health assessments (Naifeh, et al 2025)

- This 2014–2019 cohort study used PHA and Army administrative data (n = 1,042,796 PHAs from 452,473 soldiers) to develop a model to predict 6-month nonfatal and fatal suicide attempts (SAs). The model was designed to establish eligibility for a planned high-risk SA prevention intervention.
- The models evaluated the incremental predictive utility of: (1) responses to the PHA's provider-administered suicide risk screen (PHQ-9 item 9 and the P4 Screener) along with basic data on demographics and pay grade (model 1) (Supplementary Table 1), (2) responses to other PHA screening questions (model 2) (Supplementary Table 1), (3) administrative healthcare and basic career data available at the time of the PHA (model 3) (Supplementary Table 3) and (4) predictors extracted from the full range of other HADS administrative data systems and government data systems on geographic characteristics of the areas where soldiers came from before enlistment (model 4) (Supplementary Table 4).

- However, a simple least absolute shrinkage and selection operator (LASSO) penalized regression model that included a wide range of administrative predictors had good test sample discrimination (0.794 (standard error 0.009) area under the receiver operating characteristic curve) and calibration (integrated calibration index 0.0001).
- The 25% of soldiers at highest predicted risk accounted for 69.5% of 6-month SAs, supporting use of the model to target preventive interventions

REFERENCES:

References are numbered to coincide with numbering in "Publications and Findings" section above.

1. Ursano, R. J., Colpe, L. J., Heeringa, S. G., Kessler, R. C., Schoenbaum, M., & Stein, M. B. (2014). The Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). Psychiatry, 77(2), 107-119. doi: 10.1521/psyc.2014.77.2.107.
2. Gilman, S. E., Bromet, E. J., Cox, K. L., Colpe, L. J., Fullerton, C. S., Gruber, M. J., Heeringa,
   S. G., Lewandowski-Romps, L., Millikan-Bell, A. M., Naifeh, J. A., Nock, M. K., Petukhova,
   M. V., Sampson, N. A., Schoenbaum, M., Stein, M. B., Ursano, R. J., Wessely, S., Zaslavsky, A. M., & Kessler R. C. (2014). Sociodemographic and career history predictors of suicide mortality in the United States Army 2004–2009. *Psychological Medicine, 44*(12), 2579-2592. doi: 10.1017/S003329171400018X.
3. Schoenbaum, M., Kessler, R. C., Gilman, S. E., Colpe, L. J., Heeringa, S. G., Stein, M. B., Ursano, R. J., & Cox, K. L. (2014). Predictors of suicide and accident death in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS): Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry, 71*(5), 493-503. doi: 10.1001/jamapsychiatry.2013.4417.
4. Kessler, R. C., Heeringa, S. G., Stein, M. B., Colpe, L. J., Fullerton, C. S., Hwang, I., Naifeh, J. A., Nock, M. K., Petukhova, M., Sampson, N. A., Shoenbaum, M., Zaslavsky, A. M., & Ursano,
   R. J. (2014). Thirty-day prevalence of DSM-IV mental disorders among nondeployed soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry, 71*(5), 504-513. doi: 10.1001/jamapsychiatry.2014.28.
5. Nock, M. K., Stein, M. B., Heeringa, S. G., Ursano, R. J., Colpe, L. J., Fullerton, C. S., Hwang, I., Naifeh, J. A., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Kessler, R. C. (2014). Prevalence and correlates of suicidal behavior among soldiers: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry, 71*(5), 514-522. doi: 10.1001./jamapsychiatry.2014.30.
6. Lewandowski-Romps, L., Peterson, C., Berglund, P. A., Collins, S., Cox, K., Hauret, K., Jones, B., Kessler, R. C., Mitchell, C., Park, N., Schoenbaum, M., Stein, M. B., Ursano, R. J., & Heeringa, S. G. (2014). Risk factors for accident death in the U.S. Army, 2004-2009. *American Journal of Preventive Medicine, 47*(6), 745-753. doi: 10.1016/j.amepre.2014.07.052.
7. Kessler, R. C., Warner, C. H., Ivany, C., Petukhova, M. V., Rose, S., Bromet, E. J., Brown, M. 3rd, Cai, T., Colpe, L. J., Cox, K. L., Fullerton, C. S., Gilman, S. E., Gruber, M. J., Heeringa, S. G., Lewandowski-Romps, L., Li, J., Millikan-Bell, A. M., Naifeh, J. A., Nock, M. K., Rosellini, A. J., Sampson, N. A., Schoenbaum, M., Stein, M. B., Wessely, S., Zaslavsky, A. M., & Ursano,

R. J. (2015). Predicting suicides after psychiatric hospitalization in U.S. Army soldiers: the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry, 72*(1), 49-57. doi: 10.1001/jamapsychiatry.2014.1752.

8. Rosellini, A. J., Heeringa, S. G., Stein, M. B., Ursano, R. J., Chiu, W. T., Colpe, L. J., Fullerton, C. S., Gilman, S. E., Hwang, I., Naifeh, J. A., Nock, M. K., Petukhova, M., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Kessler, R. C. (2015). Lifetime prevalence of DSM-IV mental disorders among new soldiers in the U.S. Army: Results from: the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Depression and Anxiety, 32*(1), 13–24. doi:10.1002/da22316.
9. Ursano, R. J., Heeringa, S. G., Stein, M. B., Jain, S., Raman, R., Sun, X., Chiu, W. T., Colpe, L. J., Fullerton, C. S., Gilman, S. E., Hwang, I., Naifeh, J. A., Nock, M. K., Rosellini, A. J., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Kessler, R. C. (2015). Prevalence and correlates of suicidal behavior among new soldiers in the U.S. Army: results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Depression and Anxiety, 32*(1), 3–12. doi:10.1002/da.22317.
10. Nock, M. K., Ursano, R. J., Heeringa, S. G., Stein, M. B., Jain, S., Raman, R., Sun, X., Chiu, W. T., Colpe, L. J., Fullerton, C. S., Gilman, S. E., Hwang, I., Naifeh, J. A., Rosellini, A. J, Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Kessler, R. C. (2015). Mental disorders, comorbidity, and pre-enlistment suicidal behavior among new soldiers in the U.S. Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Suicide and Life Threatening Behavior*, 45(5), 588-599. doi: 10.1111/sltb.12153.
11. Street, A. E., Gilman, S. E., Rosellini, A. J., Stein, M. B., Bromet, E. J., Cox, K. L., Colpe, L. J., Fullerton, C. S., Gruber, M. J., Heeringa, S. G., Lewandowski-Romps, L., Little, R. J. A., Naifeh, J. A., Nock, M. K., Sampson, N. A., Schoenbaum, M., Ursano, R. J., Zaslavsky, A. M., & Kessler, R. C. (2015). Understanding the elevated suicide risk of female soldiers during deployments. *Psychological Medicine, 45*(4), 717–726. doi: 10.1017/S003329171400258X.
12. Ursano, R. J., Kessler, R. C., Heeringa, S. G., Cox, K. L., Naifeh, J. A., Fullerton, C. S., Sampson, N. A., Kao, T-C., Aliaga, P. A., Vegella, P., Mash, H. H., Buckley, C., Colpe, L. J., Schoenbaum, M., & Stein, M. B. (2015). Nonfatal suicidal behaviors in U.S. Army administrative records, 2004-2009: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Psychiatry: Interpersonal and Biological Processes, 78*(1), 1-21. doi: 10.1080/00332747.2015.1006512.
13. Ursano, R. J., Kessler, R. C., Stein, M. B., Naifeh, J. A., Aliaga, P. A., Fullerton, C. S., Sampson, N. A., Kao, T-C, Colpe, L. J., Schoenbaum, M., Cox, K. L., & Heeringa, S. G. (2015). Suicide attempts in the U.S. Army during the wars in Afghanistan and Iraq, 2004-2009. *JAMA Psychiatry, 72*(9), 917-926. doi: 10.1001/jamapsychiatry.2015.0987.
14. Kessler, R. C., Stein, M. B., Bliese, P. D., Bromet, E. J., Chiu, W. T., Cox, K. L., Colpe, L. J., Fullerton, C. S., Gilman, S. E., Gruber, M. J., Heeringa, S. G., Lewandoski-Romps, L., Millikan-Bell, A., Naifeh, J. A., Nock, M. K., Petukhova, M. V., Rosellini, A. J., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Ursano, R. J. (2015). Occupational differences in U.S. Army suicide rates. *Psychological Medicine, 45*(15), 3293-3304. doi: 10.1017/S0033291715001294.

15. Stein, M. B., Kessler, R. C., Heeringa, S. G., Jain, S., Campbell-Sills, L., Colpe, L. J., Fullerton, C. S., Nock, M. K., Sampson, N. A., Schoenbaum, M., Sun, X., Thomas, M. L., & Ursano, R .J. (2015). Prospective longitudinal evaluation of the effect of deployment-acquired traumatic brain injury on posttraumatic stress and related disorders: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *American Journal of Psychiatry, 172*(11), 1101-1111. doi: 10.1176/appi.ajp.2015.14121572.
16. Rosellini, A. J., Monahan, J., Street, A. E., Heeringa, S. G., Hill, E. D., Petukhova, M., Reis, B. Y., Sampson, N. A., Bliese, P., Schoenbaum, M., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2016). Predicting non-familial major physical violent crime perpetration in the U.S. Army from administrative data. *Psychological Medicine, 46*(2), 303-316. doi: 10.1017/S0033291715001774.
17. Colpe, L. J., Naifeh, J. A., Aliaga, P., Sampson, N. A., Heeringa, S. G., Stein, M. B., Ursano, R. J., Fullerton, C. S., Nock, M. K., Schoenbaum, M. L., Zaslavsky, A. M., & Kessler, R. C. (2015). Mental health treatment among soldiers with current mental disorders in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Military Medicine, 180*(10), 1041-1051. doi: 10.7205/MILMED-D-14-00686.
18. Stein, M. B., Ursano, R. J., Campbell-Sills, L., Colpe, L. J., Fullerton, C. S., Heeringa, S. G., Nock, M. K., Sampson, N. A., Schoenbaum, M., Sun, X., Jain, S., & Kessler, R. C. (2016). Prognostic indicators of persistent post-concussive symptoms after deployment-related mild traumatic brain injury: A prospective longitudinal study in U.S. Army soldiers. *Journal of Neurotrauma, 33*(23), 2125-2132. doi: 10.1089/neu.2015.4320.
19. Stein, M. B., Chen, C. Y., Ursano, R. J., Cai, T., Gelernter, J., Heeringa, S. G., Jain, S., Jensen, K. P., Maihofer, A. X., Mitchell, C., Nievergelt, C. M., Nock, M. K., Neale, B. M., Polimanti, R., Ripke, S., Sun, X., Thomas, M. L., Wang, Q., Ware, E. B., Borja, S., Kessler, R. C., & Smoller, J. W. (2016). Genome-wide association studies of posttraumatic stress disorder in 2 cohorts of US Army soldiers. *JAMA Psychiatry, 73*(7), 695-704. doi: 10.1001/jamapsychiatry.2016.0350.
20. Ursano, R. J., Kessler, R. C., Stein, M. B., Naifeh, J. A., Aliaga, P. A., Fullerton, C. S., Wynn, G. H., Vegella, P. L., Ng, T. H. H., Zhang, B. G., Wryter, C. L., Sampson, N. A., Kao, T. C., Colpe, L. J., Schoenbaum, M., McCarroll, J. E., Cox, K. L., & Heeringa, S. G. (2016). Risk factors, methods, and timing of suicide attempts among U.S. Army soldiers. *JAMA Psychiatry, 73*(7), 741-749. doi: 10.1001/jamapsychiatry.2016.0600.
21. Kessler, R. C., Stein, M. B., Petukhova, M. V., Bliese, P., Bossarte, R. M., Bromet, E. J., Fullerton, C. S., Gilman, S. E., Ivany, C., Lewandowski-Romps, L., Millikan Bell, A., Naifeh, J. A, Nock, M. K., Reis, B. Y., Rosellini, A. J., Sampson, N. A., Zaslavsky, A. M., & Ursano, R. J. (2017). Predicting suicides after outpatient mental health visits in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Molecular Psychiatry, 22*(4), 544-551. doi:10. 1038/mp.2016.110.
22. Polimanti, R., Chen, C. Y., Ursano, R. J., Heeringa, S. G., Jain, S., Kessler, R. C., Nock, M. K., Smoller, J., Sun, X., Gelernter, J., & Stein, M. B. (2017). Cross-phenotype polygenic risk score analysis of persistent post-concussive symptoms in U.S. Army soldiers with deployment-acquired traumatic brain injury. *Journal of Neurotrauma, 34*(4), 781-789. doi: 10.1089/neu.2016.4550.

23. Cox, K. L., Nock, M. K., Biggs, Q. M., Borneman, J., Colpe, L., Dempsey, C. L., Heeringa, S. G., McCarroll, J. E., Ng, T. H., Schoenbaum, M., Ursano, R. J., Zhang, B. G., & Benedek, D. M. (2017). An examination of potential misclassification of Army suicides: Results from the Army Study to Assess Risk and Resilience in Servicemembers. *Suicide and Life Threatening Behavior, 47*(3), 257-265. doi: 10.1111/sltb.12280.
24. Naifeh, J. A., Colpe, L. J., Aliaga, P. A., Sampson, N. A., Heeringa, S. G., Stein, M. B., Ursano, R. J., Fullerton, C. S., Nock, M. K., Schoenbaum, M., Zaslavsky, A. M., & Kessler, R. C. (2016). Barriers to initiating and continuing mental health treatment among soldiers in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Military Medicine, 181*(9), 1021-1032. doi: 10.7205/MILMED-D-15-00211.
25. Street, A. E., Rosellini, A. J., Ursano, R. J., Heeringa, S. G., Hill, E. D., Monahan, J., Naifeh, J. A., Petukhova, M. V., Reis, B. Y., Sampson, N. A., Bliese, P. F., Stein, M. B., Zaslavsky, A. M., & Kessler, R. C. (2016). Developing a risk model to target high-risk preventive interventions for sexual assault victimization among female U.S. Army soldiers. *Clinical Psychological Science, 4*(6), 939-956. doi: 10.1177/2167702616639532.
26. Rosellini, A. J., Monahan, J., Street, A. E., Hill, E. D., Petukhova, M., Reis, B. Y., Sampson, N. A., Benedek, D. M., Bliese, P., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2017). Using administrative data to identify U.S. Army soldiers at high-risk of perpetrating minor violent crimes. *Journal of Psychiatric Research, 84*, 128-136. doi: 10.1016/j.jpsychires.2016.09.028.
27. Naifeh, J. A., Nock, M. K., Ursano, R. J., Vegella, P. L., Aliaga, P. A., Fullerton, C. S., Kessler, R. C., Wryter, C. L., Heeringa, S. G., & Stein, M. B. (2016). Neurocognitive function and suicide in U.S. Army soldiers. *Suicide and Life-Threatening Behavior, 47*(5), 589-602. doi: 10.1111/sltb.12307.
28. Stein, M. B., Campbell-Sills, L., Gelernter, J., He, F., Heeringa, S. G., Nock, M. J., Sampson, N. A., Sun, X., Jain, S., Kessler, R. C., & Ursano, R. J. (2017). Alcohol misuse and co-occurring mental disorders among new soldiers in the U.S. Army. *Alcoholism, Clinical and Experimental Research, 41*(1), 139-148. doi: 10.1111/acer.13269.
29. Ursano, R. J., Kessler, R. C., Stein, M. B., Naifeh, J. A., Nock, M. K., Aliaga, P. A., Fullerton, C. S., Wynn, G. H., Ng, T. H. H., Dinh, H. M., Sampson, N. A., Kao, T. C., Schoenbaum, M., McCarroll, J. E., Cox, K. L., & Heeringa, S. G. (2016). Medically documented suicide ideation among U.S. Army soldiers. *Suicide and Life-Threatening Behavior, 47*(5), 612-628. doi: 10.1111/sltb.12316.
30. Stein, M. B., Chen, C. Y., Jain, S., Jensen, K. P., He, F., Heeringa, S. G., Kessler, R. C., Maihofer, A., Nock, M. K., Ripke, S., Sun, X., Thomas, M. L., Ursano, R. J., Smoller, J. W., & Gelernter, J. (2017). Genetic risk variants for social anxiety. *American Journal of Medical Genetics Part B Neuropsychiatric Genetics, 174*(2), 120-131. doi: 10.1002/ajmg.b.32520.
31. Ursano, R. J., Kessler, R. C., Naifeh, J. A., Herberman-Mash, H., Fullerton, C. S., Bliese, P. D., Wynn, G. W., Aliaga, P. A., Wryter, C., Sampson, N. A., Kao, T., Colpe, L. J., Schoenmbaum, M., Cox, K. L., Heeringa, S. G., & Stein, M. B. (2017). Frequency of improvised explosive devices and suicide attempts in the U.S. Army. *Military Medicine, 182*(3), e1697-e1703. doi: 10.7205/MILMED-D-16-00270.
32. Polimanti, R., Kaufman, J., Zhao, H., Kranzler, H.R., Ursano, R.J., Kessler, R.C., Gelernter, J., & Stein, M.B. (2017). A genome-wide gene-by-trauma interaction study of alcohol misuse

in two independent cohorts identifies PRKG1 as a risk locus. *Molecular Psychiatry*, *23*, 154-160. doi: 10.1038/mp.2017.24
33. Rosellini, A. J., Street, A. E., Ursano, R. J., Chiu, W. T., Heeringa, S. G., Monahan, J., Naifeh, J. A., Petukhova, M. V., Reis, B. Y., Sampson, N. A., Bliese, P. D., Stein, M. B., Zaslavsky A. M., & Kessler, R. C. (2017). Sexual assault victimization and mental health treatment, suicide attempts, and career outcomes among women in the US Army. *American Journal of Public Health, 107*(5), 732-739. doi: 10.2105/AJPH.2017.303693.
34. Ribeiro, J. D., Gutierrez, P. M., Joiner, T. E., Kessler, R. C., Petukhova, M. V., Sampson, N. A., Stein, M. B., Ursano, R. J., & Nock, M. K. (2017). Health care contact and suicide risk documentation prior to suicide death: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Journal of Consulting and Clinical Psychology, 85*(4), 403-408. doi: 10.1037/ccp0000178.
35. Campbell-Sills, L., Kessler, R. C., Ursano, R. J., Rosellini, A. J., Afifi, T. O., Colpe, L. J., Heeringa, S. G., Nock, M. K., Sampson, N. A., Sareen, J., Schoenbaum, M., Sun, X., Jain, S., & Stein, M. B. (2017). Associations of childhood bullying victimization with lifetime suicidal behaviors among new U.S. Army soldiers. *Depression and Anxiety, 34*(8), 701-710. doi: 10.1002/da.22621.
36. Rosellini, A. J., Stein, M. B., Benedek, D. M., Bliese, P. D., Chiu, W. T., Hwang, I., Monahan, J., Nock, M. K., Petukhova, M. V., Sampson, N. A., Street, A. E., Zaslavsky, A. M., Ursano, R. J., & Kessler, R. C. (2017). Using self-report surveys at the beginning of service to develop multi-outcome risk models for new soldiers in the U.S. Army. *Psychological Medicine, 47*(13), 2275-2287. doi: 10.1017/s003329171700071x.
37. Bandoli, G., Campbell-Sills, L., Kessler, R. C., Heeringa, S. G., Nock, M. K., Rosellini, A. J., Sampson, N. A., Schoenbaum, M., Ursano, R. J., & Stein, M. B. (2017). Childhood adversity, adult stress, and the risk of major depression or generalized anxiety disorder in US soldiers: a test of the stress sensitization hypothesis. *Psychological Medicine, 47*(13), 2379-2392. doi: 10.1017/s0033291717001064.
38. Nock, M. K., Dempsey, C. L., Aliaga, P. A., Brent, D. A., Heeringa, S. G., Kessler, R. C., Stein, M. B, Ursano, R. J., & Benedek, D. (2017). Psychological autopsy study comparing suicide decedents, suicide ideators, and propensity score matched controls: Results from the Study to Assess Risk and Resilience in Service members (Army STARRS). *Psychological Medicine, 47*(15), 2663-2674. doi: 10.1017/s0033291717001179.
39. Stein, M. B., Campbell-Sills, L., Ursano, R. J., Rosellini, A. J., Colpe, L. J., He, F., Heeringa, S. G., Nock, M. K., Sampson, N. A., Schoenbaum, M., Sun, X., Jain, S., & Kessler, R. C. (2017). Childhood maltreatment and lifetime suicidal behaviors among new soldiers in the US Army: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Journal of Clinical Psychiatry, 79*(2). doi: 10.4088/JCP.16m10900.
40. Ursano, R. J., Kessler, R. C., Naifeh, J. A., Mash, H. H., Fullerton, C. S., Ng, T. H. H., Aliaga,
P. A., Wynn, G. H., Dinh, H. M., McCarroll, J. E, Sampson, N. A., Kao, T. C., Schoenbaum M., Heeringa, S. G., & Stein, M. B. (2017). Suicide attempts in U.S. Army combat arms, special forces and combat medics. *BMC Psychiatry, 17*(1), 194. doi: 10.1186/s12888-017-1350-y.

41. Millner, A. J., Ursano, R. J., Hwang, I., King, A. J., Naifeh, J. A, Sampson, N. A., Zaslavsky, A. M., Stein, M. B., Kessler, R. C., & Nock, M. K. (2017). Lifetime suicidal behaviors and career characteristics among U.S. Army Soldiers: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Suicide and Life Threatening Behavior, 48*(2), 230-250. doi: 10.1111/sltb.12363.
42. Ursano, R. J., Kessler, R. C., Naifeh, J. A., Herberman-Mash, H., Fullerton, C. S., Bliese, P. D., Zaslavsky, A. M., Ng, T. H. H., Aliaga, P. A., Wynn, G. H., Dinh, H. M., McCarroll, J. E., Sampson, N. A., Kao, T. C., Schoenbaum, M., Heeringa, S. G., & Stein, M. B. (2017). Risk of suicide attempt among soldiers in army units with a history of suicide attempts. *JAMA Psychiatry, 74*(9), 924-931. doi: 10.1001/jamapsychiatry.2017.1925
43. Rosellini, A. J., Monahan, J., Street, A. E., Petukhova, M. V., Sampson, N. A., Benedek, D. M., Bliese, P. B., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2017). Predicting sexual assault perpetration in the U.S. Army using administrative data. *American Journal of Preventive Medicine, 53*(5), 661-669. doi: 10.1016/j.amepre.2017.06.022
44. Stein, M. B., Ware, E. B., Mitchell, C., Chen, C. Y., Borja, S., Cai, T., Dempsey, C. L., Fullerton, C. S., Gelernter, J., Heeringa, S. G., Jain, S., Kessler, R. C., Naifeh, J. A., Nock, M. K., Ripke, S., Sun, X., Beckham, J. C., Kimbrel, N. A., VA Mid-Atlantic Mental Illness Research, Education, and Clinical Center (MIRECC) Workgroup, Ursano, R. J. & Smoller, J. W. (2017). Genomewide association studies of suicide attempts in U.S. soldiers. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics, 174*(8), 786-797. doi: 10.1002/ajmg.b.32594
45. Millner, A. J., Ursano, R. J., Hwang, I., King, A. J., Naifeh, J. A., Sampson, N. A., Zaslavsky, A. M., Stein, M. B., Kessler, R. C., & Nock, M. K. (2017). Prior mental disorders and lifetime suicidal behaviors among US Army soldiers in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Suicide and Life Threatening Behavior, 49*(1), 3-22. doi: 10.1111/sltb.12394
46. Ursano, R. J., Stein, M. B., Mash, H. B. Herberman, Naifeh, J. A., Fullerton, C. S., Zaslavsky, A. M., Ng, T. H. H., Aliaga, P. A., Wynn, G. H., Dinh, H. M., McCarroll, J. E., Sampson, N. A., Kao, T. C., Schoenbaum, M., Heeringa, S. G., & Kessler, R. C. (2017). Documented family violence and risk of suicide attempt among U.S. Army soldiers. *Psychiatry Research, 262,* 575-582. doi: 10.1016/j.psychres.2017.09.046
47. Campbell-Sills, L., Ursano, R. J., Kessler, R. C., Sun, X., Heeringa, S. G., Nock, M. K., Sampson, N. A., Jain, S., & Stein, M. B. (2017). Prospective risk factors for post-deployment heavy drinking and alcohol or substance use disorder among US Army soldiers. *Psychological Medicine*, *48*(10), 1624-1633. doi: 10.1017/s0033291717003105
48. Campbell-Sills, L., Kessler, R. C., Ursano, R. J., Sun, X., Taylor, C. T., Heeringa, S. G., Nock, M. K., Sampson, N. A., Jain, S., & Stein, M. B. (2017). Predictive validity and correlates of self-assessed resilience among U.S. Army soldiers. *Depression and Anxiety, 35*(2), 122-131. doi: 10.1002/da.22694
49. Lewandowski-Romps, L., Schroeder, H. M., Berglund, P. A., Colpe, L., Cox, K., Hauret, K., Hay, J. D., Jones, B., Little, R. J. A., Mitchell, C., Schoenbaum, M., Schulz, P., Stein, M. B., Ursano, R. J., & Heeringa, S. G. (2017). Medical-encounter mental health diagnoses, non-fatal injury and polypharmacy indicators of risk for accident death in the U.S. Army enlisted soldiers, 2004-2009. *Preventive Medicine*, *111*, 299-306. doi: 10.1016/j.ypmed.2017.11.016

50. Polimanti, R., Kaufman, J., Zhao, H., Kranzler, H. R., Ursano, R. J., Kessler, R. C., Stein, M. B., & Gelernter, J. (2017). Trauma exposure interacts with the genetic risk of bipolar disorder in alcohol misuse of U.S. soldiers. *Acta Psychiatrica Scandinavica, 137*(2), 148-156. doi: 10.1111/acps.12843
51. Stein, M. B., McCarthy, M. J., Chen, C.-Y., Jain, S., Gelernter, J., He, F., Heeringa, S. G., Kessler, R. C, Nock, M. K., Ripke, S., Sun, X., Wynn, G. H., Smoller, J. W., & Ursano, R. J. (2018). Genome-wide analysis of insomnia disorder. *Molecular Psychiatry, 23*(11), 2238-2250. doi: 10.1038/s41380-018-0033-5
52. Nock, M. K., Millner, A. J., Joiner, T. E., Gutierrez, P. M., Han, G., Hwang, I., King, A., Naifeh, J. A., Sampson, N. A., Zaslavasky, A. M., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2018). Risk factors for the transition from suicide ideation to suicide attempt: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). J *Abnorm Psychol*, 127(2), 139-149. doi: 10.1037/abn0000317
53. Bernecker, S. L., Rosellini, A. J., Nock, M. K., Chiu, W. T., Gutierrez, P. M., Hwang, I., Joiner, T. E., Naifeh, J. A., Sampson, N. A., Zaslavsky, A. M., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2018). Improving risk prediction accuracy for new soldiers in the U.S. Army by adding self-report survey data to administrative data. *BMC Psychiatry*, 18(1), 87. doi:10.1186/s12888-018-1656-4
54. Ursano, R. J., Kessler, R. C., Naifeh, J. A., Mash, H. H., Fullerton, C. S., Aliaga, P. A., Wynn, G. H., Ng, T. H. H., Dinh, H. M., Sampson, N. A., Kao, T. C., Bliese, P. D. & Stein, M. B. (2018). Associations of time-related deployment variables with risk of suicide attempt among soldiers: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry, 75*(6), 586-604. doi:10.1001/jamapsychiatry.2018.0296
55. Ursano, R. J., Naifeh, J. A., Kessler, R. C., Gonzalez, O. I., Fullerton, C. S., Mash, H. H., Riggs-Donovan, C. A., Ng, T. H. H., Wynn, G. H., Dinh, H. M., Kao, T. C., Sampson, N. A., Heeringa, S. G. & Stein, M. B. (2018). Nonfatal suicidal behaviors in the administrative records of activated U.S. Army National Guard and Army Reserve Soldiers, 2004–2009. *Psychiatry*, *81*(2), 173-192. doi:10.1080/00332747.2018.1460716
56. Rosellini, A. J., Stein, M. B., Benedek, D. M., Bliese, P. D., Chiu, W. T., Hwang, I., Monahan, J., Nock, M. K., Sampson, N. A., Street, A. E., Zaslavsky, A. M., Ursano, R. J., & Kessler, R. C. (2018). Predeployment predictors of psychiatric disorder-symptoms and interpersonal violence during combat deployment. *Depress Anxiety, 35*(11), 1073-1080. doi:10.1002/da.22807
57. Ursano, R. J., Kessler, R. C., Naifeh, J. A., Mash, H. B. H., Nock, M. K., Aliaga, P. A., Fullerton, C. S., Wynn, G. H., Ng, T. H. H., Dinh, H. M., Sampson, N. A., Kao, T., Heeringa, S. G., & Stein, M. B. (2018). Risk factors associated with attempted suicide among U.S. Army soldiers without a history of mental health diagnosis. *JAMA Psychiatry, 75(*10), 1022-1032. doi:10.1001/jamapsychiatry.2018.2069
58. Nock, M. K., Han, G., Millner, A. J., Gutierrez, P. M., Joiner, T. E., Hwang, I., King, A., Naifeh, J. A., Sampson, N.A., Zaslavsky, A. M., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2018). Patterns and predictors of persistence of suicide ideation: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *J Abnorm Psychol, 127*(7), 650-658. doi:10.1037/abn0000379

59. Howlett, J. R., Campbell-Sills, L., Jain, S., Heeringa, S. G., Nock, M. K., Sun, X., Ursano, R. J., Stein, M. B. (2018). Attention deficit hyperactivity disorder and risk of posttraumatic stress and related disorders: A prospective longitudinal evaluation in U.S. Army soldiers. *Journal of Traumatic Stress, 31*(6), 909-918. doi:10.1002/jts.22347
60. Wang, H. E., Campbell-Sills, L., Kessler, R. C., Sun, X., Heeringa, S. G., Nock, M. K., Ursano, R. J., Jain, S., & Stein, M. B. (2018). Pre-deployment insomnia is associated with post-deployment PTSD and suicidal ideation in US Army soldiers. *Sleep, 42*(2). doi:10.1093/sleep/zsy229
61. Bernecker, S. L., Zuromski, K. L., Gutierrez, P. M., Joiner, T. E., King, A. J., Liu, H., Nock, M. K., Sampson, N. A., Zaslavsky, A. M., Stein, M. B., Ursano, R. J. & Kessler, R. C. (2018). Predicting suicide attempts among soldiers who deny suicidal ideation in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Behav Res Ther*. doi:10.1016/j.brat.2018.11.018
62. Naifeh, J. A., Ursano, R. J., Kessler, R. C., Zaslavsky, A. M., Nock, M. K., Dempsey, C. L., Bartolanzo, D., Ng, T. H. H., Aliaga, P. A., Zuromski, K. L., Dinh, H. M., Fullerton, C. S., Kao, T. C., Mash, H. B. H., Sampson, N. A., Wynn, G. H., & Stein, M. B. (2018). Transition to suicide attempt from recent suicide ideation in U.S. Army soldiers: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Depress Anxiety*. doi:10.1002/da.22870
63. Naifeh, J. A., Ursano, R. J., Kessler, R. C., Gonzalez, O. I., Fullerton, C. S., Herberman Mash, H. B., Riggs-Donovan, C. A., Ng, T. H. H., Wynn, G. H., Dinh, H. M., Kao, T. C., Sampson, N. A., & Stein, M. B. (2019). Suicide attempts among activated Soldiers in the U.S. Army reserve components. *BMC Psychiatry, 19*(1), 31. doi:10.1186/s12888-018-1978-2
64. Anderson, L., Campbell-Sills, L., Ursano, R. J., Kessler, R. C., Sun, X., Heeringa, S. G., Nock, M. K., Bliese, P. D., Gonzalez, O. I., Wynn, G. H., Jain, S., & Stein, M. B. (2019). Prospective associations of perceived unit cohesion with postdeployment mental health outcomes. *Depress Anxiety*. doi:10.1002/da.22884
65. Campbell-Sills, L., Kessler, R. C., Ursano, R. J., Sun, X., Heeringa, S. G., Nock, M. K., Jain, S., & Stein, M. B. (2019). Nicotine dependence and pre-enlistment suicidal behavior among U.S. Army soldiers. *Am J Prev Med, 56*(3), 420-428. doi:10.1016/j.amepre.2018.09.016
66. Zuromski, K. L., Bernecker, S. L., Gutierrez, P. M., Joiner, T. E., King, A. J., Liu, H., Naifeh, J. A., Nock, M. K., Sampson, N. A., Zaslvasky, A. M., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2019). Assessment of a risk index for suicide attempts among US Army Soldiers with suicide ideation: Analysis of data from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Netw Open*, *2*(3), e190766. doi:10.1001/jamanetworkopen.2019.0766
67. Choi, K. W., Chen, C. Y., Ursano, R. J., Sun, X., Jain, S., Kessler, R. C., Koenen, K. C., Wang, M. J., Wynn, G. H., Major Depressive Disorder Working Group of the Psychiatric Genomics Consortium, Campbell-Sills, L., Stein, M. B., & Smoller, J. W. (2019). Prospective study of polygenic risk, protective factors, and incident depression following combat deployment in US Army soldiers. *Psychol Med*, 1-9. doi:10.1017/s0033291719000527
68. Zuromski, K. L., Dempsey, C. L., Ng, T. H. H., Riggs-Donovan, C. A., Brent, D. A., Heeringa, S. G., Kessler, R. C., Stein, M. B., Ursano, R. J., Benedek, M. K. & Nock, M. K.

(2019). Utilization of and barriers to treatment among suicide decedents: Results from the Army Study to Assess Risk and Resilience Among Servicemembers (Army STARRS). *J Consult Clin Psychol*. doi:10.1037/ccp0000400
69. Stein, M. B., Choi, K. W., Jain, S., Campbell-Sills, L., Chen, C. Y., Gelernter, J., He, F., Heeringa, S. G., Maihofer, A. X., Nievergelt, C., Nock, M. K., Ripke, S., Sun, X., Kessler, R. C., Smoller, J. W., & Ursano, R. J. (2019). Genome-wide analyses of psychological resilience in U.S. Army soldiers. *Am J Med Genet B Neuropsychiatr Genet*. doi:10.1002/ajmg.b.32730
70. Dempsey, C. L., Benedek, D. M., Zuromski, K. L., Riggs-Donovan, C., Ng, T. H. H., Nock, M. K., Kessler, R. C., & Ursano, R. J. (2019). Association of firearm ownership, use, accessibility, and storage practices with suicide risk among US Army soldiers. *JAMA Netw Open*, *2*(6), e195383. doi:10.1001/jamanetworkopen.2019.5383
71. Campbell-Sills, L., Stein, M. B., Liu, H., Agtarap, S., Heeringa, S. G., Nock, M. K., Ursano, R. J. & Kessler, R. C. (2019). Associations of lifetime traumatic brain injury characteristics with prospective suicide attempt among deployed US Army Soldiers. *J Head Trauma Rehabil*. doi:10.1097/htr.0000000000000516
72. Adams, R. S., Campbell-Sills, L., Stein, M. B., Sun, X., Larson, M. J., Kessler, R. C., Ursano, R. J., Jain, S., & Corrigan, J. D. (2019). The association of lifetime and deployment-acquired traumatic brain injury with postdeployment binge and heavy drinking. *J Head Trauma Rehabil*. doi:10.1097/htr.0000000000000508
73. Zuromski, K. L., Ustun, B., Hwang, I., Keane, T. M., Marx, B. P., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2019). Developing an optimal short-form of the PTSD Checklist for DSM-5 (PCL-5). *Depress Anxiety*. doi:10.1002/da.22942
74. Agtarap, S., Campbell-Sills, L., Thomas, M. L., Kessler, R. C., Ursano, R. J., & Stein, M. B. (2019). Postconcussive, posttraumatic stress and depressive symptoms in recently deployed U.S. Army soldiers with traumatic brain injury. *Psychol Assess*. doi:10.1037/pas0000756
75. Naifeh, J. A., Ursano, R. J., Kessler, R. C., Aliaga, P. A., Mash, H. B. H., Fullerton, C. S., Ng, T. H. H., Dinh, H. M., Gonzalez, O. I., Stokes, C. M., Wynn, G. H., Kao, T. C., Sampson, N. A., & Stein, M. B. (2019). Early first deployment and risk of suicide attempt among first-term enlisted soldiers in the U.S. Army. *Suicide Life Threat Behav*. doi:10.1111/sltb.12592.
76. Stokes, C. M., Naifeh, J. A., Kessler, R. C., Stein, M. B., Fullerton, C. S., Mash, H. B. H., Riggs-Donovan, C. A., Ng, T. H. H., Aliaga, P.A., Wynn, G. H., Dinh, H. M., Kao, T. C. Gonzalez, O. I., Sampson, N. A. & Ursano, R. J. (2019). Risk factors and timing of suicide attempts among US Army Reserve Component soldiers during deployment to the Afghanistan and Iraq Wars: Results from Army Study to Assess Risk and Resilience in Servicemembers. *Psychiatry*, 82(3), 240-255. doi:10.1080/00332747.2019.1653056.
77. Bernecker, S. L., Zuromski, K. L., Curry, J. C., Kim, J. J., Gutierrez, P. M., Joiner, T. E., Kessler, R. C., Nock, M. K., Rudd, M. D., Bryan, C. J. (2019). Economic evaluation of brief cognitive behavioral therapy vs treatment as usual for suicidal US Army Soldiers. *JAMA Psychiatry*. doi: 10.1001/jamapsychiatry.2019.3639
78. Zuromski, K. L., Bernecker, S. L., Chu, C., Wilks, C. R., Gutierrez, P. M., Joiner, T. E., Liu, H., Naifeh, J.A., Nock, M. K., Sampson, N. A., Zaslavsky, A. M., Stein, M. B., Ursano, R. J., Kessler, R. C. (2019). Pre-deployment predictors of suicide attempt during and after combat

deployment: Results from the Army Study to Assess Risk and Resilience in Servicemembers. *Journal of Psychiatric Research*, 121:214-221
79. Hettema, J. M., Verhulst, B., Chatzinakos, C., Bacanu, S. A., Chen, C. Y., Ursano, R. J., Kessler, R. C., Gelernter, J., Smoller, J. W., He, F., Jain, S., & Stein, M. B. (2019). Genome-wide association study of shared liability to anxiety disorders in Army STARRS. *Am J Med Genet B Neuropsychiatr Genet*. doi:10.1002/ajmg.b.32776
80. Ursano, R. J., Herberman Mash, H. B., Kessler, R. C., Naifeh, J. A., Fullerton, C. S., Aliaga, P. A., Stokes, C. M., Wynn, G. H., Ng, T. H. H., Dinh, H. M., Gonzalez, O. I., Zaslavsky, A. M., Sampson, N. A., Kao, T. C., Heeringa, S. G., Nock, M. K., & Stein, M. B. (2020). Factors associated with suicide ideation in US Army soldiers during deployment in Afghanistan. *JAMA Network Open*, 3(1):e1919935. doi:10.1001/jamanetworkopen.2019.19935
81. Naifeh, J. A., Nock, M. K., Dempsey, C. L., Georg, M. W., Bartolanzo, D., Ng, T. H. H., Aliaga, P. A., Dinh, H. M., Fullerton, C. S., Mash, H. B. H., Kao, T. C., Sampson, N. A., Wynn, G. H., Zaslavsky, A. M., Stein, M. B., Kessler, R. C. & Ursano, R. J. (2020). Self-injurious thoughts and behaviors that differentiate soldiers who attempt suicide from those with recent suicide ideation. *Depress Anxiety*. doi:10.1002/da.23016
82. Campbell-Sills, L., Flynn, P. J., Choi, K. W., Ng, T., Aliaga, P. A., Broshek, C., Jain, S., Kessler, R. C., Stein, M. B., Ursano, R. J., & Bliese, P. D. (2020). Unit cohesion during deployment and post-deployment mental health: is cohesion an individual- or unit-level buffer for combat-exposed soldiers? *Psychological Medicine*, 1–11. Advance online publication. doi: 10.1017/S0033291720001786
83. Chu, C., Zuromski, K. L., Bernecker, S. L., Gutierrez, P. M., Joiner, T. E., Liu, H., Naifeh, J. A., Stein, M. B., Ursano, R. J., & Nock, M. K. (2020). A test of the interpersonal theory of suicide in a large, representative, retrospective and prospective study: Results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *Behaviour Research and Therapy*, 132, 103688. doi: 10.1016/j.brat.2020.103688
84. Hoffman, S. N., Taylor, C. T., Campbell-Sills, L., Thomas, M.L., Sun, X., Naifeh, J. A., Kessler, R. C., Ursano, R. J., Gur, R. C., Jain, S., Stein, M. B. (2020). Association between neurocognitive functioning and suicide attempts in U.S. Army Soldiers. *J Psychiatr Res*: S0022-3956(20)31071-2
85. Naifeh, J. A., Mash, H., Stein, M. B., Vance, M. C., Aliaga, P. A., Fullerton, C. S., Dinh, H. M., Wynn, G. H., Kao, T. C., Sampson, N. A., Kessler, R. C., & Ursano, R. J. (2021). Sex Differences in US Army Suicide Attempts During the Wars in Iraq and Afghanistan. *Medical Care*, 59, S42–S50. doi: 10.1097/MLR.0000000000001425
86. Naifeh, J. A., Ursano, R. J., Stein, M. B., Mash, H., Aliaga, P. A., Fullerton, C. S., Dinh, H. M., Vance, M. C., Wynn, G. H., Kao, T. C., Sampson, N. A., & Kessler, R. C. (2021). Risk of suicide attempt in reserve versus active component soldiers during deployment to the wars in Iraq and Afghanistan. *Suicide & Life-Threatening Behavior,* Advance online publication. doi: 10.1111/sltb.12770
87. Campbell-Sills, L., Sun, X., Choi, K. W., He, F., Ursano, R. J., Kessler, R. C., Levey, D. F., Smoller, J. W., Gelernter, J., Jain, S., & Stein, M. B. (2021). Dissecting the heterogeneity of posttraumatic stress disorder: differences in polygenic risk, stress exposures, and course of

PTSD subtypes. *Psychological Medicine,* 1–9. Advance online publication. doi: 10.1017/S0033291721000428
88. Dempsey, C. L., Benedek, D. M., Nock, M. K., Zuromski, K. L., Brent, D. A., Ao, J., Aliaga, P. A., Heeringa, S. G., Kessler, R. C., Stein, M. B., & Ursano, R. J. (2021). Social closeness and support are associated with lower risk of suicide among U.S. Army soldiers. *Suicide & life-threatening behavio*r. Advance online publication. doi: 10.1111/sltb.12778
89. Stein, M. B., Jain, S., Campbell-Sills, L., Ware, E. B., Choi, K. W., He, F., Ge, T., Gelernter, J., Smoller, J. W., Kessler, R. C., & Ursano, R. J. (2021). Polygenic risk for major depression is associated with lifetime suicide attempt in US soldiers independent of personal and parental history of major depression. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics* doi: 10.1002/ajmg.b.32868
90. Mash, H., Ursano, R. J., Kessler, R. C., Naifeh, J. A., Fullerton, C. S., Aliaga, P. A., Riggs-Donovan, C. A., Dinh, H. M., Vance, M. C., Wynn, G. H., Zaslavsky, A. M., Sampson, N. A., Kao, T. C., & Stein, M. B. (2021). Predictors of suicide attempt within 30 days after first medically documented suicidal ideation in U.S. Army Soldiers. *American Journal of Psychiatry*, Advance online publication. doi: 10.1176/appi.ajp.2021.20111570
91. Smith, D. M., Meruelo, A., Campbell-Sills, L., Sun, X., Kessler, R. C., Ursano, R. J., Jain, S., Stein, M. B., & Army STARRS Team (2021). Pre-enlistment anger attacks and post-enlistment mental disorders and suicidality among US Army Soldiers. *JAMA Network Open*, 4(9), e2126626. https://doi.org/10.1001/jamanetworkopen.2021.26626
92. Bossarte, R. M., Ziobrowski, H. N., Benedek, D. M., Dempsey, C. L., King, A. J., Nock, M. K., Sampson, N. A., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2021). Mental disorders, gun ownership, and gun carrying among soldiers after leaving the army, 2016-2019. *American Journal of Public Health, 111*(10), 1855–1864
93. Khan, A. J., Campbell-Sills, L., Sun, X., Kessler, R. C., Adler, A. B., Jain, S., Ursano, R. J., & Stein, M. B. (2021). Association between responsibility for the death of others and postdeployment mental health and functioning in US Soldiers. *JAMA Network Open, 4*(11), e2130810
94. Campbell-Sills, L., Kautz, J. D., Choi, K. W., Naifeh, J. A., Aliaga, P. A., Jain, S., Sun, X., Kessler, R. C., Stein, M. B., Ursano, R. J., & Bliese, P. D. (2023). Effects of prior deployments and perceived resilience on anger trajectories of combat-deployed soldiers. *Psychological Medicine*, 53(5), 2031–2040
95. Naifeh, J. A., Nock, M. K., Dempsey, C. L., Georg, M. W., Aliaga, P. A., Dinh, H. M., Fullerton, C. S., Mash, H. B. H., Kao, T.-C., Sampson, N. A., Wynn, G. H., Zaslavsky, A. M., Stein, M. B., Kessler, R. C., & Ursano, R. J. (2021). Association of emotion reactivity and distress intolerance with suicide attempts in U.S. Army soldiers. *Suicide and Life-Threatening Behavior*
96. Stanley, I. H., Chu, C., Gildea, S. M., Hwang, I. H., King, A. J., Kennedy, C. J., Luedtke, A., Marx, B. P., O'Brien, R., Petukhova, M. V., Sampson, N. A., Vogt, D., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2022). Predicting suicide attempts among U.S. Army soldiers after leaving active duty using information available before leaving active duty: results from the Study to Assess Risk and Resilience in Servicemembers-Longitudinal Study (STARRS-LS). *Molecular Psychiatry*

97. Koh, K. A., Montgomery, A. E., O'Brien, R. W., Kennedy, C. J., Luedtke, A., Sampson, N. A., Gildea, S. M., Hwang, I., King, A. J., Petriceks, A. H., Petukhova, M. V., Stein, M. B., Ursano, R. J., & Kessler, R. C. Predicting homelessness among U.S. Army Soldiers no longer on active duty. *American Journal of Preventive Medicine*
98. Chu, C., Stanley, I. H., Marx, B. P., King, A. J., Vogt, D., Gildea, S. M., Hwang, I. H., Sampson, N. A., O'Brien, R., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2022). Associations of vulnerability to stressful life events with suicide attempts after active duty among high-risk soldiers: results from the Study to Assess Risk and Resilience in Servicemembers-Longitudinal study (STARRS-LS). Psychological Medicine, 1–11
99. Naifeh, J. A., Ursano, R. J., Stein, M. B., Mash, H., Aliaga, P. A., Fullerton, C. S., Dinh, H. M., Kao, T. C., Sampson, N. A., & Kessler, R. C. (2022). Association of premilitary mental health with suicide attempts during U.S. Army service. *JAMA Network Open, 5(6)*
100. Naifeh, J. A., Capaldi, V. F., Chu, C., King, A. J., Koh, K. A., Marx, B. P., Montgomery, A. E., O'Brien, R. W., Sampson, N. A., Stanley, I. H., Tsai, J., Vogt, D., Ursano, R. J., Stein, M. B., & Kessler, R. C. (2022). Prospective associations of military discharge characterization with post-active duty suicide attempts and homelessness: Results from the Study to Assess Risk and Resilience in Servicemembers-Longitudinal Study (STARRS-LS). *Military Medicine*, usac232. Advance online publication. https://doi.org/10.1093/milmed/usac232
101. Taylor, C. T., Campbell-Sills, L., Kessler, R. C., Sun, X., Nock, M. K., Ursano, R. J., Jain, S., & Stein, M. B. (2022). Social network size and personality traits independently and prospectively predict distress disorders and suicidal behavior in U.S. Army soldiers. *Psychological Medicine*, 1–10. Advance online publication. https://doi.org/10.1017/S0033291722002082
102. Naifeh, J. A., Ursano, R. J., Stein, M. B., Herberman Mash, H. B., Aliaga, P. A., Fullerton, C. S., Dinh, H. M., Kao, T.-C., Sampson, N. A., & Kessler, R. C. (2022). Prospective associations of emotion reactivity and risk behaviors with suicide attempts in U.S. Army soldiers. *Psychological Medicine*. Advance online publication.
103. Dempsey, C. L., Benedek, D. M., Zuromski, K. L., Nock, M. K., Brent, D. A., Ao, J., Georg, M. W., Haller, K., Aliaga, P. A., Heeringa, S. G., Kessler, R. C., Stein, M. B., & Ursano, R. J. (2023). Recent stressful experiences and suicide risk: implications for suicide prevention and Intervention in U.S. Army soldiers. *Psychiatric research and clinical practice*, *5*(1), 24–36.
104. Campbell-Sills, L., Sun, X., Kessler, R. C., Ursano, R. J., Jain, S., & Stein, M. B. (2023). Exposure to bullying or hazing during deployment and mental health outcomes among U.S. Army soldiers. *JAMA network open*, 6(1), e2252109.
105. Montgomery, A. E., Koh, K. A., King, A. J., O'Brien, R., Sampson, N. A., Petriceks, A., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2023). Stressful life events and risk of homelessness after active duty: an assessment of risk and resilience among service members. *Public Health Reports (Washington, D.C.: 1974)*, 333549221149092. Advance online publication.
106. Campbell-Sills, L., Papini, S., Norman, S. B., Choi, K. W., He, F., Sun, X., Kessler, R. C., Ursano, R. J., Jain, S., & Stein, M. B. (2023). Associations of polygenic risk scores with

posttraumatic stress symptom trajectories following combat deployment. *Psychological medicine,* 1–10. Advance online publication.
107. Kearns, J., Edwards, E., Finley, E., Geraci, J., Gildea, S., Goodman, M., . . . Kessler, R. (2023). A practical risk calculator for suicidal behavior among transitioning U.S. Army soldiers: Results from the Study to Assess Risk and Resilience in Servicemembers-Longitudinal Study (STARRS-LS). *Psychological Medicine,* 1-10. doi:10.1017/S0033291723000491
108. Campbell-Sills, L., Sun, X., Papini, S., Choi, K. W., He, F., Kessler, R. C., Ursano, R. J., Jain, S., & Stein, M. B. (2023). Genetic, environmental, and behavioral correlates of lifetime suicide attempt: Analysis of additive and interactive effects in two cohorts of US Army soldiers. *Neuropsychopharmacology : official publication of the American College of Neuropsychopharmacology*, 10.1038/s41386-023-01596-2. Advance online publication. https://doi.org/10.1038/s41386-023-01596-2
109. Mash, H.B. Herberman, Ursano, R.J., Kessler, R.C., Naifeh, J.A., Fullerton, C.S., Aliaga, P.A., Dinh, H.M., Sampson, N.A., Kao, T.-C., & Stein, M.B. (2023). Predictors of suicide attempt within 30 days of first medically documented major depression diagnosis in U.S. Army Soldiers with no prior suicidal ideation. *BMC Psychiatry*, 23, 392. doi: 10.1186/s12888-023-04872-z.
110. Gabbay, F. H., Wynn, G. H., Georg, M. W., Gildea, S. M., Kennedy, C. J., King, A. J., Sampson, N. A., Ursano, R. J., Stein, M. B., Wagner, J. R., Kessler, R. C., & Capaldi, V. F. (2023). Toward personalized care for insomnia in the US Army: development of a machine learning model to predict response to pharmacotherapy. *Journal of clinical sleep medicine: JCSM: official publication of the American Academy of Sleep Medicine*, 10.5664/jcsm.10574. Advance online publication. https://doi.org/10.5664/jcsm.10574
111. Papini, S., Norman, S. B., Campbell-Sills, L., Sun, X., He, F., Kessler, R. C., Ursano, R. J., Jain, S., & Stein, M. B. (2023). Development and Validation of a Machine Learning Prediction Model of Posttraumatic Stress Disorder After Military Deployment. *JAMA Network Open*, 6(6), e2321273. https://doi.org/10.1001/jamanetworkopen.2023.21273
112. Campbell-Sills, L., Kautz, J. D., Ray, C., Lester, P. B., Choi, K. W., Naifeh, J. A., Aliaga, P. A., Kessler, R. C., Stein, M. B., Ursano, R. J., & Bliese, P. D. (2023). Associations of active-duty mental health trajectories with post-military adjustment: Results from the STARRS Longitudinal Study. *Journal of Affective Disorders*, 340, 535–541. Advance online publication.
113. Naifeh, J. A., Ursano, R. J., Stein, M. B., Mash, H. B. H., Aliaga, P. A., Fullerton, C. S., Shor, R., Kao, T. C., Sampson, N. A., & Kessler, R. C. (2023). Optimism, Sociability, and the Risk of Future Suicide Attempt among U.S. Army Soldiers. *Military Medicine*, usad457. Advance online publication. doi.org/10.1093/milmed/usad457
114. Naifeh, J. A., Ursano, R. J., Stein, M. B., Wang, J., Mash, H. B. H., Aliaga, P. A., Fullerton, C. S., Dinh, H. M., Kao, T. C., Sampson, N. A., & Kessler, R. C. (2023). Prospective association of attachment style with suicide attempts among US Army soldiers. *Psychological medicine*, 1–9. Advance online publication. doi.org/10.1017/S0033291723002489

115. Wilkerson, M. D., Hupalo, D., Gray, J. C., Zhang, X., Wang, J., Girgenti, M. J., Alba, C., Sukumar, G., Lott, N. M., Naifeh, J. A., Aliaga, P., Kessler, R. C., Turner, C., Pollard, H. B., Dalgard, C. L., Ursano, R. J., & Stein, M. B. (2023). Uncommon Protein-Coding Variants Associated With Suicide Attempt in a Diverse Sample of U.S. Army Soldiers. *Biological Psychiatry*, S0006-3223(23)01783-3. Advance online publication. https://doi.org/10.1016/j.biopsych.2023.12.008
116. Zuromski, K. L., Wilks, C. R., Al-Suwaidi, M., Wittler, E., Scherban, L., Hite, B., Raymond, L., Dempsey, C. L., Stein, M. B., Ursano, R. J., Benedek, D., & Nock, M. K. (2024). Perspectives of suicide loss survivors: Qualitative analysis of data from a psychological autopsy study of U.S. Army soldiers. *Suicide & Life-threatening Behavior*, 10.1111/sltb.13052. Advance online publication. https://doi.org/10.1111/sltb.13052
117. Stein, M. B., Jain, S., Papini, S., Campbell-Sills, L., Choi, K. W., Martis, B., Sun, X., He, F., Ware, E. B., Naifeh, J. A., Aliaga, P. A., Ge, T., for International Suicide Genetics Consortium, for MVP Suicide Exemplar Workgroup, for VA Million Veteran Program, for Suicide Working Group of the Psychiatric Genomics Consortium, Smoller, J. W., Gelernter, J., Kessler, R. C., & Ursano, R. J. (2024). Polygenic risk for suicide attempt is associated with lifetime suicide attempt in US soldiers independent of parental risk. *Journal of Affective Disorders*, *351*, 671–682. https://doi.org/10.1016/j.jad.2024.01.254
118. Campbell-Sills, L., Choi, K. W., Strizver, S. D., Kautz, J. D., Papini, S., Aliaga, P. A., Lester, P. B., Naifeh, J. A., Ray, C., Kessler, R. C., Ursano, R. J., Stein, M. B., & Bliese, P. D. (2024). Interactive effects of genetic liability and combat exposure on risk of alcohol use disorder among US service members. *Drug and Alcohol Dependence*, *264*, 112459. Advance online publication. https://doi.org/10.1016/j.drugalcdep.2024.112459
119. Kennedy, C. J., Kearns, J. C., Geraci, J. C., Gildea, S. M., Hwang, I. H., King, A. J., Liu, H., Luedtke, A., Marx, B. P., Papini, S., Petukhova, M. V., Sampson, N. A., Smoller, J. W., Wolock, C. J., Zainal, N. H., Stein, M. B., Ursano, R. J., Wagner, J. R., & Kessler, R. C. (2024). Predicting Suicides Among US Army Soldiers After Leaving Active Service. *JAMA psychiatry*, e242744. Advance online publication. https://doi.org/10.1001/jamapsychiatry.2024.2744
120. Kessler, R. C., Bossarte, R. M., Hwang, I., Luedtke, A., Naifeh, J. A., Nock, M. K., Petukhova, M., Sadikova, E., Sampson, N. A., Sverdrup, E., Zubizarreta, J. R., Wager, S., Wagner, J., Stein, M. B., & Ursano, R. J. (2024). A prediction model for differential resilience to the effects of combat-related stressors in US army soldiers. *International Journal of Methods in Psychiatric Research*, *33*(4), e70006. https://doi.org/10.1002/mpr.70006
121. Naifeh, J. A., Edwards, E. R., Bentley, K. H., Gildea, S. M., Kennedy, C. J., King, A. J., Kleiman, E. J., Luedtke, A., Nassif, T. H., Nock, M. K., Sampson, N. A., Zainal, N. H., Stein, M. B., Capaldi, V. F., Ursano, R. J & Kessler, R. C. (2025). Predicting suicide attempts among US Army soldiers using information available at the time of periodic health assessments. *Nature Mental Health.* https://doi.org/10.1038/s44220-024-00360-9

ARMY STARRS METHODS PUBLICATIONS:

1. Gadermann, A. M., Engel, C. C., Naifeh, J. A., Nock, M. K., Petukhova, M., Santiago, P. N., Wu, B., Zaslavsky, A. M., & Kessler, R. C. (2012). Prevalence of DSM-IV major depression among U.S. military personnel: Meta-analysis and simulation. *Military Medicine, 177*(8), 47-59. doi: 10.7205/MILMED-D-12-00103.
2. Gadermann, A. M., Gilman, S. E., McLaughlin, K. A., Nock, M. K., Petukhova, M., Sampson, N. A., & Kessler, R. C. (2012). Projected rates of psychological disorders and suicidality among soldiers based on simulations of matched general population data. *Military Medicine, 177*(9), 1002-1010. doi: 10.7205/MILMED-D-12-00092.
3. Thomas, M. L., Brown, G. C., Gur, R. C., Hansen, J. A., Nock, M. K., Heeringa, S., Ursano, R. J., & Stein, M. B. (2013). Parallel psychometric and cognitive modeling analyses of the Penn Face Memory Test in the Army Study to Assess Risk and Resilience in Servicemembers. *Journal of Clinical and Experimental Neuropsychology, 35*(3), 225-245. doi.10.1080/13803395.2012.762974.
4. Nock, M. K., Deming, C. A., Fullerton, C. S., Gilman, S. E., Goldenberg, M., Kessler, R. C., McCarroll, J. E., McLaughlin, K. A., Peterson, C., Schoenbaum, M., Stanley, B., & Ursano, R. J. (2013). Suicide among soldiers: A review of psychosocial risk and protective factors. *Psychiatry, 76*(2), 97-125. doi: 10.1521/psyc.2013.76.2.97.
5. Heeringa, S. G., Gebler, N., Colpe, L. J., Fullerton, C. S., Hwang, I., Kessler, R. C., Naifeh, J. A., Nock, M. K., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., Stein, M. B., & Ursano, R. J. (2013). Field procedures in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *International Journal of Methods in Psychiatric Research, 22*(4), 276–287. doi: 10.1002/mpr.1400.
6. Kessler, R. C., Colpe, L. J., Fullerton, C. S., Gebler, N., Naifeh, J. A., Nock, M. K., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., Stein, M. B., Ursano, R. J., & Heeringa, S. G. (2013). Design of the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *International Journal of Methods in Psychiatric Research, 22*(4), 267–275. doi: 10.1002/mpr.1401.
7. Kessler, R. C., Heeringa, S. G., Colpe, L. J., Fullerton, C. S., Gebler, N., Hwang, I., Naifeh, J. A., Nock, M. K., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., Stein, M. B., & Ursano, R. J. (2013). Response bias, weighting adjustments, and design effects in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *International Journal of Methods in Psychiatric Research, 22*(4), 288–302. doi: 10.1002/mpr.1399.
8. Kessler, R. C., Santiago, P. N., Colpe, L. J., Dempsey, C. L., First, M. B., Heeringa, S. G., Stein, M. B., Fullerton, C. S., Gruber, M. J., Naifeh, J. A., Nock, M. K., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Ursano, R. J. (2013). Clinical reappraisal of the Composite International Diagnostic Interview Screening Scales (CIDI-SC) in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *International Journal of Methods in Psychiatric Research, 22*(4), 303–321. doi: 10.1002/mpr.1398.

9. Gadermann, A. M., Heeringa, S. G., Stein, M. B., Ursano, R. J., Colpe, L. J., Fullerton, C. S., Gilman, S. E., Gruber, M. J., Nock, M. K., Rosellini, A. J., Sampson, N. A., Schoenbaum, M., Zaslavsky, A. M., & Kessler, R. C. (2014). Classifying U.S. Army Military Occupational Specialties using the Occupational Information Network. *Military Medicine, 179*(7), 752-761. doi: 10.7205/MILMED-D-13-00446.
10. Rosellini, A. J., Stein, M. B., Colpe, L. J., Heeringa, S. G., Petukhova, M. V., Sampson, N. A., Schoenbaum, M., Ursano, R. J., & Kessler, R. C. (2015). Approximating a DSM-5 diagnosis of PTSD using DSM-IV criteria. *Depression and Anxiety, 32*(7), 493-501. doi: 10.1002/da.22364.
11. Thomas, M. L., Brown, G. G., Gur, R. C., Moore, T. M., Patt, V. M., Nock, M. K., Naifeh, J. A., Heeringa, S., Ursano, R. J., & Stein, M. B. (2015). Measurement of latent cognitive abilities involved in concept identification learning. *Journal of Clinical and Experimental Neuropsychology, 37*(6), 653–669. doi: 10.1080/13803395.2015.1042358.
12. Wagner, J., Schroeder, H. M., Piskorowski, A., Ursano, R. J., Stein, M. B., Heeringa, S. G., & Colpe, L. J. (2017). Timing the mode switch in a sequential mixed-mode survey: An experimental evaluation of the impact on final response rates, key estimates, and costs. *Social Science Computer Review, 35*(2), 262-276. doi: 10.1177/0894439316654611.
13. Moore, T. M., Gur, R. C., Thomas, M .L., Brown, G. G., Nock, M. K., Savitt, A. P., Keilp, J. G., Heeringa, S., Ursano, R. J., & Stein, M. B. (2017). Development, administration, and structural validity of a brief, computerized neurocognitive battery. *Assessment, 26*(1), 125-143. doi: 10.1177/107319111668920.

PUBLICATIONS FROM COLLABORATION WITH THE PSYCHIATRIC GENOMICS CONSORTIUM:

The following publications represent an example of the broader impact of STARRS resulting from our collaboration and data sharing. STARRS investigators shared STARRS GWAS and other data with the NIMH Psychiatric Genomics Consortium (PGC) to yield the largest sample ever examined of the GWAS of PTSD. STARRS was the largest contributor of GWAS data to this effort. These publications are based on analyses of pooled data from a consortium of investigators conducting genetic studies on PTSD and other psychiatric disorders.

1. Dunn, E. C., Sofer, T., Gallo, L. C., Gogarten, S. M., Kerr, K. F., Chen, C. Y., Stein, M. B., Ursano, R. J., Guo, X., Jia, Y., Qi, Q., Rotter, J. I., Argos, M., Cai, J., Penedo, F. J., Perreira, K., Wassertheil-Smoller, S., & Smoller, J. W. Genome-wide association study of generalized anxiety symptoms in the Hispanic Community Health Study/Study of Latinos. (2017). *Am J Med Genet B Neuropsychiatr Genet.* Mar; 174(2): 132-143.

- This study aimed to discover potential loci by conducting a genome-wide analysis of GAD symptoms in a large, population-based sample of Hispanic/Latino adults using data from 12,282 participants, aged 18-74, of the Hispanic Community Health Study/Study of Latinos.

- Using a shortened Spielberger Trait Anxiety measure, the study analyzed: (1) a GAD symptoms score restricted to the 3 items tapping diagnostic features of GAD as defined by DSM-V; and (2) a total trait anxiety score based on summing responses to all 10 items. Study first calculated heritability due to common variants (h2SNP) and then conducted a genome-wide association study (GWAS) of GAD symptoms. Replication was attempted in 3 independent Hispanic cohorts (Multi-Ethnic Study of Atherosclerosis, Women's Health Initiative, Army STARRS).

- The GAD symptoms score showed evidence of modest heritability while the total trait anxiety score did not. One genotyped SNP (rs78602344) intronic to thrombospondin 2 (THBS2) was nominally associated in the primary analysis adjusting for psychiatric medication use and significantly associated with the GAD symptoms score in the analysis excluding medication users. Meta-analysis of the replication samples did not support this association.

- The study identified a genome-wide significant locus in this sample, but was unable to replicate this finding. Evidence for heritability was also only detected for GAD symptoms, and not the trait anxiety measure, suggesting differential genetic influences within the domain of trait anxiety.

2. Wolf, E. J., Maniates, H., Nugent, N., Maihofer, A. X., Armstrong, D., Ratanatharathorn, A., Ashley-Koch, A. E., Garrett, M., Kimbrel, N. A., Lori, A., VA Mid-Atlantic Mirecc Workgroup, Aiello, A. E., Baker, D. G., Beckham, J. C., Boks, M. P., Galea, S., Geuze, E., Hauser, M. A., Kessler, R. C., Koenen, K. C., Miller, M. W., Ressler, K. J., Risbrough, V., Rutten, B. P. F., Stein, M. B., Ursano, R. J., Vermetten, E., Vinkers, C. H., Uddin, M., Smith, A. K., Nievergelt, C. M., & Logue, M. W. (2017). Traumatic stress and accelerated DNA methylation age: A meta-analysis. *Psychoneuroendocrinology, 92,* 123-134. doi: 10.1016/j.psyneuen.2017.12.007.

- This study involved a meta-analysis of trauma exposure, PTSD diagnosis, and symptom severity in association with accelerated DNA methylation age using data from 9 cohorts contributing to the PGC-PTSD Epigenetics Workgroup (combined N = 2186). The study also examined associations between demographic and cellular variables and accelerated DNA methylation age.

- The results revealed that childhood trauma exposure, measured with the Childhood Trauma Questionnaire, and lifetime PTSD severity show significant meta-analytic associations with accelerated DNA methylation age. The study also found that sex, CD4T cell proportions, and natural killer cell proportions were significantly associated with accelerated DNA methylation age.

- Findings suggest that traumatic stress is associated with advanced epigenetic age and raises the possibility that cells integral to immune system maintenance and responsivity play a role in this. The study highlights the need for additional research into the biological mechanisms linking traumatic stress to accelerated DNA methylation age and the importance of furthering our understanding of the neurobiological and health consequences of PTSD.

3. Dunn, E. C., Sofer, T., Wang, M., Soare, T. S., Gallo, L. C., Gogarten, S. M., Kerr, K. F., Chen, C., Stein, M. B., Ursano, R. J., Guo, X., Jia, Y., Yao, J., Rotter, J. I., Argos, M., Cai, J., Perreira, K., Wassertheil-Smoller, S., & Smoller, J. W. Genome-wide association study (GWAS) of depressive symptoms in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). (2018). *Journal of Psychiatric Research*, 99, 167-176. doi: 10.1016/j.jpsychires.2017.12.010.

- This study involved a genome-wide analysis of depression in a large, population-based sample of Hispanics/Latinos. This is the largest GWAS of depression related phenotypes in Hispanic/Latino adults ever conducted.

- Three phenotypes were examined: a total depression score, a total score modified to account for psychiatric medication use, and a score excluding antidepressant medication users. The study included a GWAS of the three phenotypes and attempted replication in three independent Hispanic/Latino cohorts.

- Sex-stratified analyses were performed, a binary trait indicating probable depression was analyzed, and 3 trans-ethnic analyses were done. The 3 phenotypes exhibited significant heritability in the total sample. No SNPs were genome-wide significant in analyses of the 3 phenotypes or the binary indicator of probable depression. Sex-stratified analyses identified 7 genome-wide significant SNPs (1 in females; 6 in males), although none were supported through replication. Four out of 24 loci identified in prior GWAS were nominally associated. No evidence of overlap in genetic risk factors across ancestry groups was found, although this may have been due to low power.

4. Ratanatharathorn, A., Boks, M. P., Maihofer, A. X., Aiello, A. E., Amstadter, A. B., Ashley-Koch, A. E., Baker, D.G., Beckham, J. C., Bromet, E., Dennis, M., Garrett, M. E., Geuze, E., Guffanti, G., Hauser, M. A., Kilaru, V., Kimbrel, N. A., Koenen, K. C., Kuan, P. F., Logue, M. W., Luft, B. J., Miller, M.W., Mitchell, C., Nugent, N.R., Ressler, K. J., Rutten, B.P.F., Stein, M.B., Vermetten, E., Vinkers, C.H., Youssef, N. A., VA Mid-Atlantic MIRECC Workgroup, PGC PTSD Epigenetics Workgroup, Uddin, M., Nievergelt, C. M., Smith, A.K. Epigenome-wide association of PTSD from heterogeneous cohorts with a common multi-site analysis pipeline. (2017). *Am J Med Genet B Neuropsychiatr Genet*. 174(6), 619-630. doi: 10.1002/ajmg.b.32568.

- Evidence suggests that epigenetic mechanisms such as DNA methylation play a role in stress regulation and in the etiologic basis of stress related disorders such as PTSD. This study describes the purpose and methods of an international consortium developed to study the role of epigenetics in PTSD.

- Based on the PGC, this study brought together investigators representing 7 cohorts with a collective sample size of N = 1147 that included detailed information on trauma exposure, PTSD symptoms, and genome-wide DNA methylation data. The objective was to increase the analytical sample size by pooling data and combining expertise so that DNA methylation patterns associated with PTSD can be identified. Several quality control and analytical pipelines were evaluated for their control of genomic inflation and technical artifacts with a joint analysis procedure established to derive comparable data over the cohorts for meta-analysis.

- The study proposed methods to deal with ancestry population stratification and type I error inflation, and discussed advantages and disadvantages of applying robust error estimates.

- The study reported results from an epigenome-wide association study (EWAS) of age, which is a well-characterized phenotype with known epigenetic associations. While EWAS is highly complex and subject to similar challenges as genome-wide association studies (GWAS), the study demonstrated that an epigenetic meta-analysis with a relatively modest sample size can be well-powered to identify epigenetic associations. The pipeline can be used as a framework for consortium efforts for EWAS.

5. Wang, Y., Karstoft, K. I., Nievergelt, C. M., Maihofer, A. X., Stein, M. B., Ursano, R. J., Bybjerg-Grauholm, J., Baekvad-Hansen, M., Hugaard, D. M., Andreassen, O. A., Werge, T., Thompson, W. K., & Andersen, S. B. (2019). Post-traumatic stress following military deployment: Genetic associations and cross-disorder genetic correlations. *J Affect Disord*, 252, 350-357. doi:10.1016/j.jad.2019.04.070

- Post-traumatic stress disorder (PTSD) is a complex psychiatric disorder that occurs with relatively high frequency after deployment to warzones (~10%). While twin studies have estimated the heritability to be up to 40%, indicating a considerable genetic component in the etiology, the biological mechanisms underlying risk and development of PTSD remain unknown.

- This genome-wide association study (GWAS; N = 2,481) was conducted to identify genome regions that associate with PTSD in a highly homogenous, trauma-exposed sample of Danish soldiers deployed to war and conflict zones. Integrated analyses were performed with gene-expression and chromatin-contact datasets to prioritized genes. Other large GWAS (N>300,000) were leveraged to investigate genetic correlations between PTSD and other psychiatric disorders and traits.

- Study discovered, but did not replicate, one region, 4q31, close to the IL15 gene, which is genome-wide significantly associated with PTSD. Study demonstrated that gene-set enrichment, polygenic risk score and genetic correlation analyses show consistent and significant genetic correlations between PTSD and depression, insomnia and schizophrenia. The limited sample size, the lack of replication, and the PTSD case definition by questionnaire are limitations to the study.

- The results suggest that genetic perturbations of inflammatory response may contribute to the risk of PTSD. In addition, shared genetic components contribute to observed correlations between PTSD and depression, insomnia and schizophrenia.

6. Smith, A. K., Ratanatharathorn, A., Maihofer, A. X., Naviaux, R. K., Aiello, A. E., Amstadter, A. B., Ashley-Koch, A. E., Baker, D. G., Beckham, J. C., Boks, M. P., Bromet, E., Dennis, M., Galea, S., Garrett, M. E., Geuze, E., Guffanti, G., Hauser, M. A., Katrinli, S., Kilaru, V., Kessler, R. C., … Nievergelt, C. M. (2020). Epigenome-wide meta-analysis of PTSD across 10 military and civilian cohorts identifies methylation changes in AHRR. *Nature Communications*, 11(1), 5965. https://doi.org/10.1038/s41467-020-19615-x

- Epigenetic differences may help to distinguish between PTSD cases and trauma-exposed controls. This study is the largest DNA methylation meta-analysis of PTSD to date.

- Ten military and civilian cohorts contributed blood-derived DNA methylation data from 1,896 PTSD cases and trauma-exposed controls. Four CpG sites within the arylhydrocarbon receptor repressor (AHRR) were associated with PTSD after adjustment for multiple comparisons, with lower DNA methylation in PTSD cases relative to controls.

- Although AHRR methylation is known to associate with smoking, the AHRR association with PTSD was most pronounced in non-smokers, suggesting the result was independent of smoking status. Evaluation of metabolomics data reveals that AHRR methylation is associated with kynurenine levels, which are lower among subjects with PTSD.

- This study supports epigenetic differences in those with PTSD and suggests a role for decreased kynurenine as a contributor to immune dysregulation in PTSD.

7. Giannakopoulou, O., Lin, K., Meng, X., Su, M. H., Kuo, P. H., Peterson, R. E., Awasthi, S., Moscati, A., Coleman, J., Bass, N., Millwood, I. Y., Chen, Y., Chen, Z., Chen, H. C., Lu, M. L., Huang, M. C., Chen, C. H., Stahl, E. A., Loos, R., Mullins, N., … 23andMe Research Team, China Kadoorie Biobank Collaborative Group, and Major Depressive Disorder Working Group of the Psychiatric Genomics Consortium (2021). The Genetic Architecture of Depression in Individuals of East Asian Ancestry: A Genome-Wide Association Study. *JAMA Psychiatry*. Advance online publication. https://doi.org/10.1001/jamapsychiatry.2021.2099

- Most previous genome-wide association studies (GWAS) of depression have used data from individuals of European descent. This limits the understanding of the underlying biology of depression and raises questions about the transferability of findings between populations.

- This study investigated the genetics of depression among individuals of East Asian and European descent living in different geographic locations, and with different outcome definitions for depression by performing genome-wide association analyses followed by meta-analysis, which included data from 9 cohort and case-control data sets comprising individuals with depression and control individuals of East Asian descent.

- Associations of genetic variants with depression risk were assessed using generalized linear mixed models and logistic regression. The results were combined across studies using fixed-effects meta-analyses. These were subsequently also meta-analyzed with the largest published GWAS for depression among individuals of European descent. Additional meta-analyses were carried out separately by outcome definition (clinical depression vs symptom-based depression) and region (East Asian countries vs Western countries) for East Asian ancestry cohorts. Depression status was defined based on health records and self-report questionnaires.

- There were a total of 194,548 study participants (approximate mean age, 51.3 years; 62.8% women). Participants included 15,771 individuals with depression and 178,777 control individuals of East Asian descent. Five novel associations were identified, including 1 in the meta-analysis for broad depression among those of East Asian descent: rs4656484 ($\beta = -0.018$, SE = 0.003, P = 4.43x10−8) at 1q24.1. Another locus at 7p21.2 was associated in a meta-analysis restricted to geographically East Asian studies ($\beta = 0.028$, SE = 0.005, P = 6.48x10−9 for rs10240457). The lead variants of these 2 novel loci were not associated with depression risk in European ancestry cohorts ($\beta = -0.003$, SE = 0.005, P = .53 for rs4656484 and $\beta = -0.005$, SE = 0.004, P = .28 for rs10240457). Only 11% of depression loci previously identified in individuals of European descent reached nominal significance levels in the individuals of East Asian descent. The transancestry genetic correlation between cohorts of East Asian and European descent for clinical depression was r = 0.413 (SE = 0.159). Clinical depression risk was negatively genetically correlated with body mass index in individuals of East Asian descent (r = −0.212, SE = 0.084), contrary to findings for individuals of European descent.

- The authors concluded that these results support caution against generalizing findings about depression risk factors across populations and highlight the need to increase the ancestral and geographic diversity of samples with consistent phenotyping.

8. A. R. Docherty, N. Mullins, A. E. Ashley-Koch, et al. Genome-wide association study meta-analysis of suicide attempt in 43,871 cases identifies twelve genome-wide significant loci. *medRxiv*. August 2022. 2022.07.03.22277199

- Objective: Suicidal behavior is moderately heritable and a major cause of death worldwide. Two large-scale genome-wide association studies (GWAS) have recently discovered and cross-validated genome-wide significant (GWS) loci for suicide attempt (SA). The current study leveraged the genetic cohorts from these two studies to conduct the largest GWAS meta-analysis of SA to date. Ancestry-specific GWAS meta-analyses were also conducted within African, East Asian, and European ancestries.

- Methods: This study comprised 22 cohorts, including 43,871 SA cases and 915,025 ancestry-matched controls. Analytical methods across multi-ancestry and African, East Asian, and European ancestral groups included inverse variance-weighted fixed effects models, gene/gene set and tissue enrichment testing, drug-gene interaction analyses, and summary-based Mendelian Randomization with eQTL MetaBrain data.

- Results: Multi-ancestry and European GWAS meta-analyses identified 12 risk loci, including 28 independent GWS variants at p<5×10−8. Risk loci were mostly intergenic and implicated DRD2, SLC6A9, FURIN, NLGN1, SOX5, PDE4B, and CACNG2. The SNP-based heritability estimate of SA was 5.7% on the liability scale (SE=0.003, p = 5.70×10−80). Significant brain tissue gene expression and drug set

enrichment was observed, along with shared genetic variation of SA with ADHD, smoking, and risk tolerance after conditioning on both major depressive disorder and post-traumatic stress disorder.

- Conclusions: This multi-ancestry GWAS of suicide attempt identified several loci contributing to risk, and significant shared genetic covariation with relevant clinical phenotypes that is not accounted for by major depressive disorder or post-traumatic stress disorder. These findings outline molecular pathways of risk for suicide, and provide new insight into shared genetic architecture with psychiatric phenotypes across ancestries.

9. Maihofer, A. X., Engchuan, W., Huguet, G., Klein, M., MacDonald, J. R., Shanta, O., Thiruvahindrapuram, B., Jean-Louis, M., Saci, Z., Jacquemont, S., Scherer, S. W., Ketema, E., Aiello, A. E., Amstadter, A. B., Avdibegović, E., Babic, D., Baker, D. G., Bisson, J. I., Boks, M. P., Bolger, E. A., … Nievergelt, C. M. (2022). Rare copy number variation in posttraumatic stress disorder. *Molecular psychiatry*, 10.1038/s41380-022-01776-4

- Posttraumatic stress disorder (PTSD) is a heritable (h2 = 24–71%) psychiatric illness. Copy number variation (CNV) is a form of rare genetic variation that has been implicated in the etiology of psychiatric disorders, but no large-scale investigation of CNV in PTSD has been performed.

- This was an association study of CNV burden and PTSD symptoms in a sample of 114,383 participants (13,036 cases and 101,347 controls) of European ancestry. CNVs were called using two calling algorithms and intersected to a consensus set. Quality control was performed to remove strong outlier samples. CNVs were examined for association with PTSD within each cohort using linear or logistic regression analysis adjusted for population structure and CNV quality metrics, then inverse variance weighted meta-analyzed across cohorts.

- This study examined the genome-wide total span of CNVs, enrichment of CNVs within specified gene-sets, and CNVs overlapping individual genes and implicated neurodevelopmental regions. The total distance covered by deletions crossing over known neurodevelopmental CNV regions was significant (beta = 0.029, SE = 0.005, P = 6.3 × 10−8). The genome-wide neurodevelopmental CNV burden identified explained 0.034% of the variation in PTSD symptoms. The 15q11.2 BP1-BP2 microdeletion region was significantly associated with PTSD (beta = 0.0206, SE = 0.0056, P = 0.0002).

- No individual significant genes interrupted by CNV were identified. 22 gene pathways related to the function of the nervous system and brain were significant in pathway analysis (FDR q < 0.05), but these associations were not significant once NDD regions were removed. A larger sample size, better detection methods, and annotated resources of CNV are needed to explore this relationship further.

10. Katrinli, S., Wani, A. H., Maihofer, A. X., Ratanatharathorn, A., Daskalakis, N. P., Montalvo-Ortiz, J., Núñez-Ríos, D. L., Zannas, A. S., Zhao, X., Aiello, A. E., Ashley-Koch, A. E., Avetyan, D., Baker, D. G., Beckham, J. C., Boks, M. P., Brick, L. A., Bromet, E., Champagne, F. A., Chen, C. Y., Dalvie, S., … Logue, M. W. (2024). Epigenome-wide association studies identify novel DNA methylation sites associated with PTSD: a meta-analysis of 23 military and civilian cohorts. *Genome medicine*, *16*(1), 147. doi:10.1186/s13073-024-01417-1

- The occurrence of post-traumatic stress disorder (PTSD) following a traumatic event is associated with biological differences that can represent the susceptibility to PTSD, the impact of trauma, or the sequelae of PTSD itself. These effects include differences in DNA methylation (DNAm), an important form of epigenetic gene regulation, at multiple CpG loci across the genome.

- This study aims to identify blood DNAm differences associated with PTSD and characterize the underlying biological mechanisms by examining the extent to which they mirror associations across multiple brain regions.

- As the Psychiatric Genomics Consortium (PGC) PTSD Epigenetics Workgroup, this study conducted the largest cross-sectional meta-analysis of epigenome-wide association studies (EWASs) of PTSD to date, involving 5077 participants (2156 PTSD cases and 2921 trauma-exposed controls) from 23 civilian and military studies. PTSD diagnosis assessments were harmonized following the standardized guidelines established by the PGC-PTSD Workgroup. DNAm was assayed from blood using Illumina HumanMethylation450 or MethylationEPIC (850 K) BeadChips.

- This study identifies 11 PTSD-associated CpGs and leverages data from postmortem brain samples, GWAS, and genome-wide expression data to interpret the biology underlying these associations and prioritize genes whose regulation differs in those with PTSD.

STARRS-RELATED PUBLICATIONS:

The following are STARRS-related publications. These publications include members of the STARRS Research Team as co-authors, except where noted with an asterisk. Some of these publications summarize or review previously published STARRS findings and others present new findings.

1. Gonzalez, O. I., Naifeh, J. A., Mash, H. H. (2018, June). Interpersonal Violence and Suicide Risk Among U.S. Army Soldiers. *ISTSS Stress Points*, 32(3). Retrieved from http://sherwood-istss.informz.net/admin31/content/template.asp?sid=60943&brandid=4463&uid=1044618441&mi=7664760&mfqid=40875668&ptid=&ps=60943
2. Naifeh, J. A., Mash, H. B. H., Stein, M. B., Fullerton, C. S., Kessler, R. C., & Ursano, R. J. (2018). The Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS): Progress toward understanding suicide among soldiers. *Mol Psychiatry, 24*, 34-48. doi:10.1038/s41380-018-0197-z.
3. Levey, D. F., Polimanti, R., Cheng, Z., Zhou, H., Nunez, Y. Z., Jain, S., He, F., Sun, X., Ursano, R. J., Kessler, R. C., Smoller, J. W., Stein, M. B., Kranzler, H. R., & Gelernter, J. (2019). Genetic associations with suicide attempt severity and genetic overlap with major depression. *Transl Psychiatry, 9*(1), 22. doi:10.1038/s41398-018-0340-2
4. Karlsson Linner, R., Biroli, P., Kong, E., Meddens, S. F. W., Wedow, R., Fontana, M. A., Lebreton, M., Tino, S. P., Abdellaoui, A., Hammerschlad, A. R., Nivard, M. G., Okbay, A., Rietveld, C. A., Timshel, P. N., Trzaskowski, M., Vlaming, R. Zund, C. L., Bao, Y., Buzdugan, L., Caplin, A. H., Chen, C. Y., Eibich, P., Fontanillas, P., Gonzalez, J. R., Joshi, P. K., Karhunen, V., Kleinman, A., Levin, R. Z., Lill, C. M., Meddens, G. A., Muntain, G., Sanchez-Roige, S., Rooij, F. J. V., Taskesen, E., Wu, Y., Zhang, F. l., Auton, A., Boardman, J. D., Clark, D. W., Conlin, A., Dolan, C. C., Fischbacher, U., Groenen, P. J. F., Harris, K. M., Hasler, G., Hofman, A., Ikram, M. A., Jain, S., Karlsson, R., Kessler, R. C., Kooyman, M., MacKillop, J., Mannikko, M., Morcillo-Suarez, C., McQueen, M. B., Schmidt, K. M., Smart, M. C., Sutter, M., Thurik, A. R., Uitterlinden, A. G., White, J., Wit, H., Yang, J., Betram, L., Boomsma, D. I., Esko, T., Fehr, E., Hinds, D. A., Johannesson, M., Kumari, M., Laibson, D., Magnusson, P. K. E., Myer, M. N., Navarro, A., Palmer, A. A., Pers, T. H., Posthuma, D., Schunk, D., Stein, M. B., Svento, R., Tiemeier, H., Timmers, P. R. H. J., Turley, P., Ursano, R. J., Wagner, G. G., Wilson, J. F., Gratten, J., Lee, J. J., Cesarini, D., Benjamin, D. J., Koellinger, P. D., & Beauchamp, J. P. (2019). Genome-wide association analyses of risk tolerance and risky behaviors in over 1 million individuals identify hundreds of loci and shared genetic influences. *Nat Genet, 51*, 245-257. doi:10.1038/s41588-018-0309-3.
5. Kessler, R. C., Bossarte, R. M., Luedtke, A., Zaslavsky, A. M., & Zubizarreta, J. R. (2019). Suicide prediction models: A critical review of recent research with recommendations for the way forward. *Mol Psychiatry*. doi:10.1038/s41380-019-0531-0.

6. * Curley, J. M., Penix, E. A., Srinivasan, J., Sarmiento, D. M., McFarling, L. H., Newman, J. B., & Wheeler, L. A. (2019). Development of the U.S. Army's Suicide Prevention Leadership Tool: The Behavioral Health Readiness and Suicide Risk Reduction Review (R4). *Mil Med*. doi:10.1093/milmed/usz380
7. Snijders, C., Maihofer, A. X., Ratanatharathorn, A., Baker, D. G., Boks, M. P., Geuze, E., Jain, S., Kessler, R. C., Pishva, E., Risbrough, V. B., Stein, M. B., Ursano, R. J., Vermetten, E., Vinkers, C. H., PGC PTSD EWAS Consortium, Smith, A. K., Uddin, M., Rutten, B. P. F., & Nievergelt, C. M. (2020). Longitudinal epigenome-wide association studies of three male military cohorts reveal multiple CpG sites associated with post-traumatic stress disorder. *Clinical epigenetics*, *12*(1), 11. doi: /10.1186/s13148-019-0798-7
8. Logue, M. W., Miller, M. W., Wolf, E. J., Huber, B. R., Morrison, F. G., Zhou, Z., Zheng, Y., Smith, A. K., Daskalakis, N. P., Ratanatharathorn, A., Uddin, M., Nievergelt, C. M., Ashley-Koch, A. E., Baker, D. G., Beckham, J. C., Garrett, M. E., Boks, M. P., Geuze, E., Grant, G. A., Hauser, M. A., Kessler, R.C., Kimbrel, N.A., Maihofer, A.X., Marx, C.E., Qin, X.J., Risbrough, V.B., Rutten, B.P.F., Stein, M.B., Ursano, R.J., Vermetten E., Vinkers, C.H., Ware, E.B., Stone, A., Schichman, S.A., McGlinchey, R.E., Milberg, W.P., Hayes, J.P., Verfaellie, M., & the Traumatic Stress Brain Study Group (2020). An epigenome-wide association study of posttraumatic stress disorder in US veterans implicates several new DNA methylation loci. Clinical epigenetics, 12(1), 46. doi:10.1186/s13148-020-0820-0
9. Qiu, H., Carone, M., Sadikova, E., Petukhova, M., Kessler, R. C., Luedtke, A. (2020). Optimal Individualized Decision Rules Using Instrumental Variable Methods. *Journal of the American Statistical Association,* May 12
10. * Duncan, J. M., Reed-Fitzke, K., Ferraro, A. J., Wojciak, A. S., Smith, K. M., Sánchez, J. (2020). Identifying Risk and Resilience Factors Associated With the Likelihood of Seeking Mental Health Care Among U.S. Army Soldiers-in-Training. *Mil Med*, Feb 20, pii: usz483
11. Chu, C., Wilks, C. R., Zuromski, K. L., Bernecker, S. L., King, A., Gutierrez, P. M., Joiner, T. E., Nock, M. K., Ursano, R.J., Kessler, R. C. (2020). Psychological Problems among 12th-Grade Students Predicting Military Enlistment: Findings from the Monitoring the Future Survey. *Psychiatry*, 83:244–258
12. Polimanti, R., Levey, D. F., Pathak, G. A., Wendt, F. R., Nunez, Y. Z., Ursano, R. J., Kessler, R. C., Kranzler, H. R., Stein, M. B., & Gelernter, J. (2021). Multi-environment gene interactions linked to the interplay between polysubstance dependence and suicidality. Translational psychiatry, 11(1), 34. doi:10.1038/s41398-020-01153-1
13. Katrinli, S., Maihofer, A. X., Wani, A. H., Pfeiffer, J. R., Ketema, E., Ratanatharathorn, A., Baker, D. G., Boks, M. P., Geuze, E., Kessler, R. C., Risbrough, V. B., Rutten, B. P. F., Stein, M. B., Ursano, R. J., Vermetten, E., Logue, M. W., Nievergelt, C. M., Smith, A. K., & Uddin, M. (2022). Epigenome-wide meta-analysis of PTSD symptom severity in three military cohorts implicates DNA methylation changes in genes involved in immune system and oxidative stress. Molecular psychiatry, 27(3), 1720–1728. doi:10.1038/s41380-021-01398-2

CSTS Uniformed Services University
Center for the Study of Traumatic Stress
Department of Psychiatry
Uniformed Services University
4301 Jones Bridge Road, Bethesda, MD 20814-4799
www.CSTSonline.org

STARRS-RELATED COMMENTARIES:

The following are STARRS-related commentaries. These commentaries relate to STARRS publications.

1. Friedman M. J. (2014). Suicide risk among soldiers: early findings from Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA psychiatry*, *71*(5), 487–489. doi:10.1001/jamapsychiatry.2014.24
2. Friedman M. J. (2015). Risk factors for suicides among army personnel. *JAMA*, *313*(11), 1154–1155. doi.org: 10.1001/jama.2014.15303
3. Ressler, K. J., & Schoomaker, E. B. (2014). Commentary on "The Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS)": Army STARRS: a Framingham-like study of psychological health risk factors in soldiers. *Psychiatry*, *77*(2), 120–129. doi:10.1521/psyc.2014.77.2.120
4. Keane T. M. (2015). Toward a greater understanding of mental health issues in today's military. *Depression and anxiety*, *32*(1), 1–2. doi:10.1002/da.22324
5. Goodwin, L., Wessely, S., & Fear, N. T. (2015). The Future of "Big Data" in Suicide Behaviors Research: Can We Compare the Experiences of the U.S. and U.K. Armed Forces?. *Psychiatry*, *78*(1), 25–28. doi:10.1080/00332747.2015.1016783
6. Flatau P. M. (2015). Suicide Among US Military Personnel. *JAMA*, *314*(1), 84. doi:10.1001/jama.2015.5742
7. Friedman M. J. (2015). Suicide Among US Military Personnel--Reply. *JAMA*, *314*(1), 84–85. doi:10.1001/jama.2015.5757
8. Ivany, C. G., & Hoge, C. W. (2016). Suicide Attempts in the US Army. *JAMA psychiatry*, *73*(2), 176. doi:10.1001/jamapsychiatry.2015.2363
9. Ursano, R. J., Kessler, R. C., & Stein, M. B. (2016). Suicide Attempts in the US Army--Reply. *JAMA psychiatry*, *73*(2), 176–177. doi:10.1001/jamapsychiatry.2015.2559
10. Ressler K. J. (2016). The Intersection of Environment and the Genome in Posttraumatic Stress Disorder. *JAMA Psychiatry*, *73*(7), 653–654. doi:10.1001/jamapsychiatry.2016.0349
11. Ruan, X., Chiravuri, S., & Kaye, A. D. (2017). Suicide Attempts Among US Army Soldiers. *JAMA Psychiatry*, *74*(1), 106. doi:10.1001/jamapsychiatry.2016.2280
12. Ursano, R. J., Kessler, R. C., & Stein, M. B. (2017). Suicide Attempts Among US Army Soldiers--Reply. *JAMA psychiatry*, *74*(1), 106–107. doi:10.1001/jamapsychiatry.2016.2746
13. Sumner, J. A., Duncan, L. E., Wolf, E. J., Amstadter, A. B., Baker, D. G., Beckham, J. C., Gelaye, B., Hemmings, S., Kimbrel, N. A., Logue, M. W., Michopoulos, V., Mitchell, K. S., Nievergelt, C., Rothbaum, A., Seedat, S., Shinozaki, G., & Vermetten, E. (2017). Letter to the Editor: Posttraumatic stress disorder has genetic overlap with cardiometabolic traits. *Psychological medicine*, *47*(11), 2036–2039. doi:10.1017/S0033291717000733
14. Stein, M. B., Chen, C. Y., Jain, S., Jensen, K. P., He, F., Heeringa, S. G., Kessler, R. C., Maihofer, A., Nock, M. K., Ripke, S., Sun, X., Thomas, M. L., Ursano, R. J., Smoller, J. W., Gelernter, J., & Army STARRS Collaborators (2017). Genetic risk variants for social anxiety. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics : the official publication of the International Society of Psychiatric Genetics*, *174*(2), 120–131. doi:10.1002/ajmg.b.32520

15. Kimerling R. (2017). No Mission Too Difficult: Responding to Military Sexual Assault. *American Journal of Public Health*, *107*(5), 642–644. doi:10.2105/AJPH.2017.303731
16. Reger, M. A., Smolenski, D. J., & Carter, S. P. (2018). Suicide Prevention in the US Army: A Mission for More Than Mental Health Clinicians. *JAMA psychiatry*, *75*(10), 991–992. doi:10.1001/jamapsychiatry.2018.2042
17. Kessler R. C. (2019). Clinical Epidemiological Research on Suicide-Related Behaviors-Where We Are and Where We Need to Go. *JAMA psychiatry*, *76*(8), 777–778. doi:10.1001/jamapsychiatry.2019.1238
18. Bossarte, R., & Riggs-Donovan, C. A. (2020). Risk of Suicide and Other Adverse Outcomes among Servicemembers: Looking beyond the Military Experience. *Psychiatry*, *83*(3), 259–261. doi:10.1080/00332747.2020.1804787
19. Ursano, R. J., & Naifeh, J. A. (2021). TBI and Suicidality: A Story of Stress, Risk, and Resilience. *Military medicine*, *186*(1-2), 42–44. doi:10.1093/milmed/usaa452