



Army Study to Assess Risk and Resilience in Servicemembers

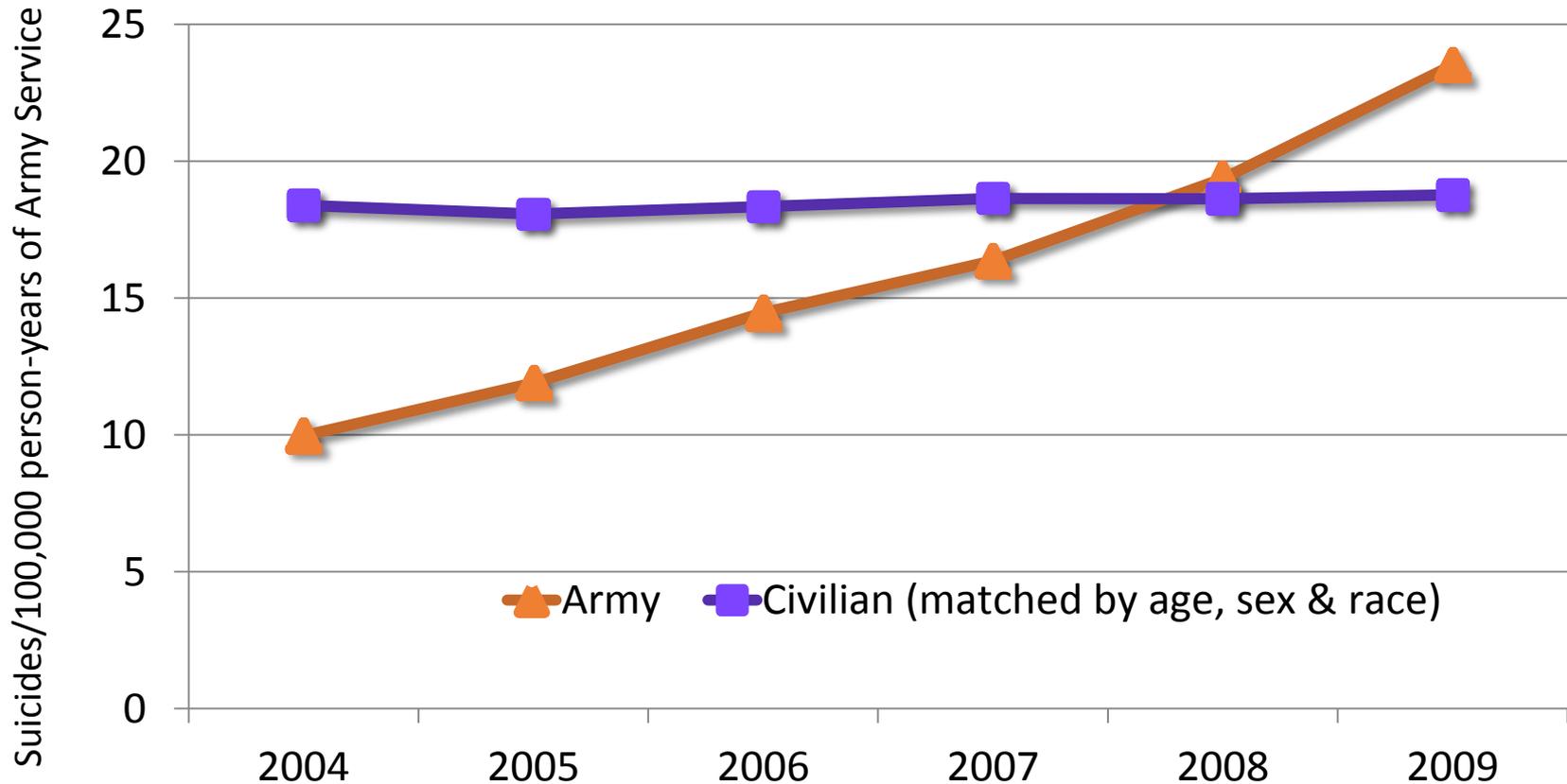
# Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS)

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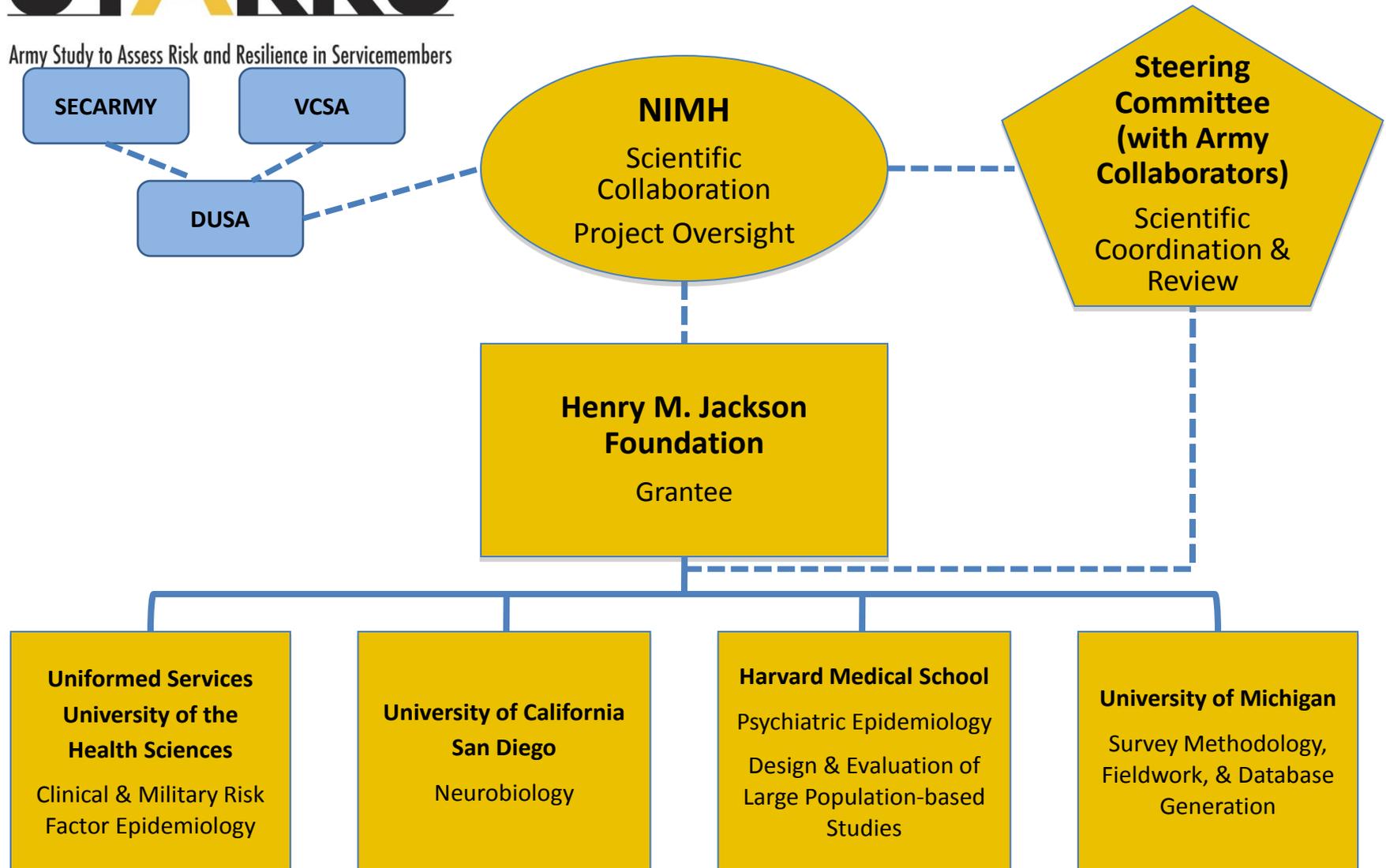
National Institute of Mental Health

# Active Duty Army Suicide Rate



SOURCES: Army STARRS calculations (Army); Centers for Disease Control (civilian)

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## Steering Committee

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Kenneth L. Cox, M.D., M.P.H.	Medical Informatics Consultant	U.S. Army

# Funding & Management

- \$65 million total costs for 5-year project period
  - \$50 million core funding from the Army
  - \$15 million supplement from NIMH
- Integration & coordination of efforts with relevant U.S. Army research & public health institutions
- The Office of the Deputy Under Secretary of the Army & NIMH closely coordinate efforts
- Cooperative agreement number U01MH087981



# Army STARRS Study Aims

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- To develop data-driven methods for mitigating or preventing suicide behaviors and improving Soldiers' overall mental health and behavioral functioning.
- To identify salient neurobiological and psychosocial risk and resilience factors for suicide and mental disorders associated with suicide among Army personnel.
- To provide information to the Army that can help them develop, target, and implement effective empirically-derived preventive interventions.
- To deliver these actionable findings rapidly.
- To expand scientific understanding of neurobiological and psychosocial risk and resilience factors for suicide and the mental disorders associated with them that can be used beyond the confines of the US Army.



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# Key Components of the Army STARRS Data Collection Program

## **Historical Data Study**

Aggregation of data in a wide range of Army and DoD administrative databases to create a consolidated dataset for all Soldiers in the Army in the years 2004-2009. Information is included in the dataset on deaths by manner (suicide, accident, combat, homicide, other) and nonfatal injuries by cause (suicide attempts, accidents, combat-related, other). Analysis focuses on studying the administrative database predictors of these outcomes in a survival analysis framework.

## **New Soldier Study (NSS)**

An ongoing survey of risk and resilience factors, including blood samples among new Soldiers in basic training to predict subsequent suicide and other psychopathological outcomes.

## **All Army Study (AAS)**

A quarterly tracking survey of suicidality, mental disorders, and barriers to seeking behavioral health treatment, and evaluation of Army interventions in a representative sample of Active Duty Soldiers, Guard and Reserve.

## **Pre/Post Deployment Study (PPDS)**

A survey of 10,000 soon-to-deploy Soldiers who are administered all the questions in the NSS and AAS along with blood samples and then are re-interviewed and provide second blood samples after redeployment.

## **Soldier Health Outcomes Study A (SHOS-A)**

Retrospective case-control study of hospitalized suicide attempters compared to appropriately matched controls.

## **Soldier Health Outcomes Study B (SHOS-B)**

Psychological autopsy study of completed suicides and controls.



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Component	Milestones
<p><b>Historical Data Study</b></p>	<ul style="list-style-type: none"> <li>• Analysis of Data Enclave on-going</li> <li>• &gt; 1.1 <u>billion</u> data records on 1.6 million Soldiers currently in Data Enclave</li> </ul>
<p><b>New Soldier Study (NSS)</b></p>	<ul style="list-style-type: none"> <li>• Production continues at Fts. Jackson, Benning and Leonard Wood</li> <li>• Blood sample collection began 20 Sept 2011</li> <li>• <b>34,954 participants as of 19 May 2012</b></li> <li>• <b>17,999 blood vials as of 19 May 2012</b></li> </ul>
<p><b>All Army Study (AAS)</b></p>	<ul style="list-style-type: none"> <li>• CONUS , OCONUS and Kuwait (In-Theater) data collection on-going</li> <li>• <b>23,232 participants as of 19 May 2012</b></li> </ul>
<p><b>Pre/Post Deployment Study (PPDS)</b></p>	<ul style="list-style-type: none"> <li>• Pilot study at Ft. Bragg 18-20 Oct 2011</li> <li>• Pre-Deployment phase at Fts. Carson &amp; Bragg (Jan 2012), JBLM (Feb 2012),</li> <li>• <b>9,495 Participants in Pre phase</b></li> <li>• <b>Post Deployment phase begins Sept-October 2012</b></li> </ul>
<p><b>Soldier Health Outcomes Study A (SHOS-A)</b></p>	<ul style="list-style-type: none"> <li>• Currently enrolling subjects at all 5 MTFs (JBLM, Ft. Hood, Ft. Bragg, Ft. Stewart, Walter Reed)</li> <li>• <b>55 participants as of 19 May 2012 (Enrollment began Nov 2011 at first MTF)</b></li> </ul>
<p><b>Soldier Health Outcomes Study B (SHOS-B)</b></p>	<ul style="list-style-type: none"> <li>• Study launched March 2012</li> <li>• 17 case or control related participants as of 19 may 2012</li> </ul>



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# New Soldier Study Survey Components

## Session 1

- TELL US ABOUT YOURSELF
- YOUR HEALTH
- ADHD
- DEPRESSION
- HIGH MOOD
- ANXIETY
- IRRITABILITY AND ANGER
- PANIC ATTACKS
- ANGER ATTACKS
- STRESSFUL EXPERIENCES
- SPIRITUALITY
- TREATMENT
- HOW YOU SEE YOURSELF
- *NEUROCOGNITIVE TESTS*

## Session 2

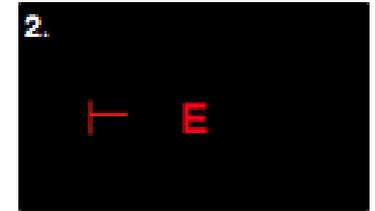
- INJURIES
- TOBACCO, ALCOHOL, DRUGS
- SELF-HARM
- FAMILY HISTORY
- SOCIAL SUPPORT
- CHILDHOOD
- HOW YOU SEE YOURSELF
- *NEUROCOGNITIVE TESTS*

## Neurocognitive Tests

1. **Sensorimotor processing:** hand-eye coordination



2. **Continuous performance test:** vigilance/impulsiveness



3. **Emotion ID test:** identifying facial expressions



4. **Facial memory test:** visual/face memory



5. **N-back test:** attention and working memory



6. **Conditional exclusion test:** mental flexibility



7. **Go no-go test:** impulsiveness



8. **Stroop test:** emotional interference





# The All Army Study (AAS)

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- A quarterly trend survey of all Soldiers in the Army exclusive of those in initial or advanced training.
- The survey is designed to obtain both individual-level data on onset, persistence, and worsening of mental disorders and suicidality and aggregate trend information on these same outcomes for the total Army.
- The AAS questions are a subset of the questions in the NSS focused on current prevalence.
- Unlike the NSS, the AAS data collection consists entirely of a self-administered questionnaire. There are no neurocognitive tests or blood samples.



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## **Soldier Health Outcomes Study A (SHOS-A): A Retrospective Case-control Study of Suicide Attempters and Controls**

- SHOS-A is a multi-site (hospitals) retrospective case-control study of risk and resilience factors among hospitalized suicide attempters compared to appropriately matched controls.
- A subset of these suicide attempters (and all controls) participated previously in the NSS or AAS.
- NSS and AAS data are being obtained after the suicide attempt for all attempters who did not previously participate in the NSS or AAS.
- Administrative data are also available for all suicide attempters and controls.
- SHOS-A collects additional retrospective data to investigate precursors of suicide attempts, including more in-depth clinical assessments than in the NSS and AAS and focused questions about trigger events in the month, week, and days leading up to the suicide attempt.



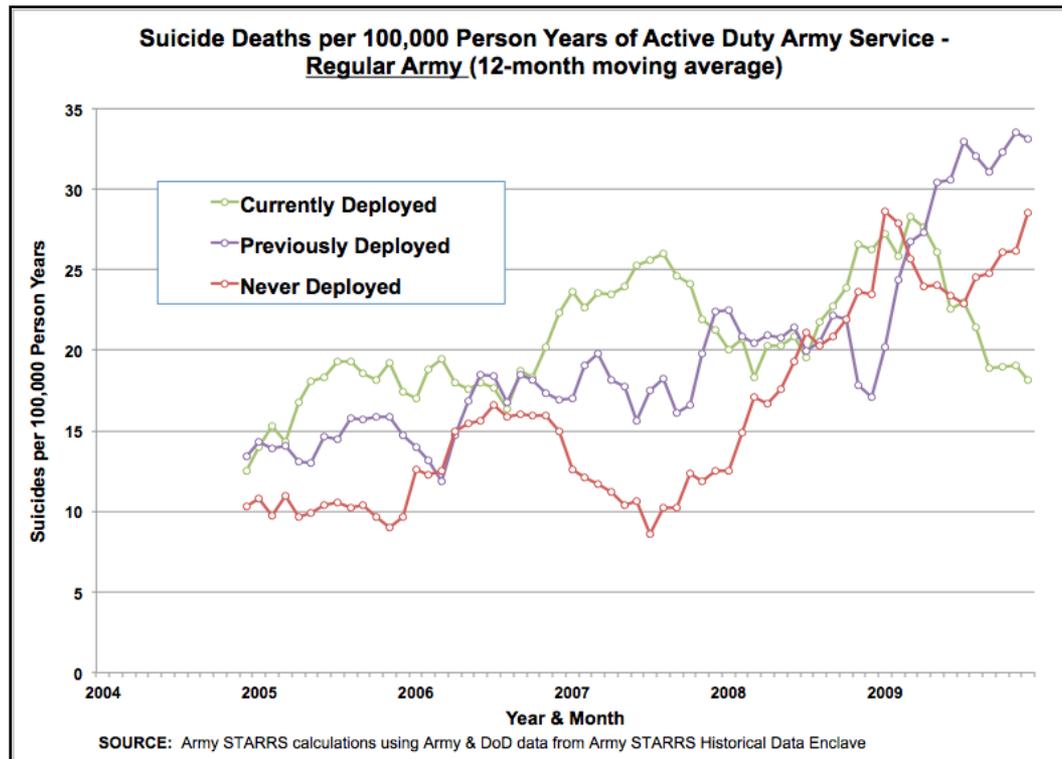


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## **Soldier Health Outcome Study B (SHOS-B): A Psychological Autopsy Study of Suicide Completers and Controls**

- SHOS-B is a retrospective case-control study of risk and resilience factors among Soldiers who committed suicide compared to appropriately matched controls.
- A subset of these suicide completers (and all controls) will have participated previously in the NSS or AAS.
- Informant reports for key NSS and AAS variables are being obtained after the suicide for all completers who did not previously participate in the NSS or AAS.
- Administrative data are also available for all suicide completers and controls.
- SHOS-B collects additional retrospective informant data from the next of kin and first-line supervisor of suicide completers and controls to investigate precursors of suicide, including more in-depth clinical assessments than in the NSS and AAS and focused questions about trigger events in the month, week, and days leading up to the suicide.





# Preliminary Findings (cont'd)

- Suicide rate increased over time for Soldiers in all settings
- On average the suicide rate is highest for those currently deployed (changes in 2009 are noted)
- Accident death rate shows a similar increase over time to suicide rate for never deployed Soldiers
- Accident death rate does not show an increase over time for currently or previously deployed Soldiers

# Preliminary Findings: Waiver Status

- Suicide rate does not vary significantly by waiver status, for any waiver category (medical, alcohol/drug test, conduct, any), relative to Soldiers without respective waiver
- Absolute number of waiver suicides is too small to drive overall rate

# Preliminary Findings: Gender

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- Women make up 14% of Regular Army, & 6% (22 of 389) of suicides in 2004-2008
  - Overall annual suicide rate of 6.1 per 100,000 for women, compared with 16.9 per 100,000 for men
- Suicide risk elevated during deployment, for enlisted men & women in 1<sup>st</sup> 48 months of Army service

Deployment Status	Enlisted Men, 1-48 mos.	Enlisted Women, 1-48 mos.
Never	18.0	3.9
Currently	32.2*	21.3*
Previously, not now	30.5*	4.4

\*Significantly different from “Never” within gender,  $p < 0.05$

- For enlisted men & women with >48 months of Army service, deployment unrelated to suicide risk

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- Goal: Create a method to identify a smaller group of Soldiers at higher risk of suicide (or accident) for targeted intervention efforts
- Approach: Can we target interventions based on multivariate profile analysis?
  - Our models “predict” cause-specific death as function of various characteristics, experiences, & exposures
  - Use model results to create a composite **predicted risk score**
- Our initial findings are promising – the 5% of Soldiers at highest predicted risk account for

	Basic model	Basic + deployment interactions
Suicide	19% of actual suicides	22% of actual suicides
Accident death	14% of accident deaths	19% of accident deaths

- Our goal is to develop more comprehensive models where the top 5% of predicted risk accounts for 1/3 or more of actual suicides

### Individual-level Prediction

- Information in the NSS, AAS, and administrative data files is being used to study risk and resilience factors that predict individual-level onset, persistence, and worsening of behavioral health problems and suicidality among Soldiers
- The same analysis approach will be applied to the PPDS once those data become available.



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[www.armystarrs.org](http://www.armystarrs.org)

## U.S. Civilian Suicide Statistics

- The 2008 suicide rate in the general population (adjusted to match age and sex distribution of Regular Army) was 18.9 per 100,000 persons<sup>1</sup>
- Suicide, accident, and homicide are the three leading causes of death among younger adults<sup>1</sup>
- In 2009, suicide deaths (36,909) outnumbered homicide deaths (16,799)<sup>1</sup>
- Non-fatal suicide attempts are 10-30 times more frequent than suicide deaths<sup>1</sup>
- 1.1 million adults (0.5% of the adult population) aged 18 years and older reported making a suicide attempt in 2010<sup>2</sup>

<sup>1</sup> Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, [www.cdc.gov/injury/wisqars](http://www.cdc.gov/injury/wisqars)

<sup>2</sup> SAMHSA report from National Survey of Drug Use and Health (NSDUH), 2010

# Risk Factors in a Civilian Sample “Matched” to the Army

**In a comparison sample of healthy & employed US citizens, excluding criminal history & major illnesses present before age 18, and age- and gender-matched to the Army:**

- **53% have a lifetime history of mental disorder, ranging in severity from mild to moderate**
  - 18% mood disorders; 27% anxiety disorders; 22% behavior disorders; 14% substance disorders
  - Among these, 91% first experienced these disorders prior to the age of enlistment.
- **Many have history of suicidal ideation, plans, & attempts**
  - 14% suicidal ideation; 5% suicide plans; 5% attempted suicide

These data from a highly selected US civilian sample, previously unavailable, provide a much improved comparison for Army data.

# Potential Implications from Civilian Data

- **Eliminating people with a history of mental disorder from the applicant pool is unlikely to be optimal**
  - Preventing a single suicide attempt would require turning away 200 people otherwise eligible for recruitment.
  - Reducing suicide attempts by 50% would require turning away 20% of people otherwise eligible for recruitment per year.
- **Mental disorders that begin in the years after enlistment are particularly potent risk factors**
  - 5-6% of “matched” civilians would develop depression or anxiety disorders after the age of enlistment.
  - This group would account for 39% of suicide attempts after enlistment age.
- **Civilian “best practices” for depression & anxiety suggest that opportunities exist to improve outcomes & reduce stigma**
  - The “Collaborative Care” model is a well-tested method for delivering evidence-based mental health treatment in general medical settings.



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# The New Soldier Study (NSS) Questionnaire

- Socio-demographics (e.g., marital status, race-ethnicity)
- Reasons for enlisting
- Pre-enlistment history of:
  - head, neck, and blast injuries
  - insomnia
  - mental illness (e.g., ADHD, depression, anxiety)
  - substance use/abuse
  - suicidality (ideation, plans, attempts)
  - treatment of behavioral health problems
  - life stress (lifetime trauma, childhood family adversity, current chronic stresses)
- Personality (e.g., dependent personality, introversion)
- Temperament (e.g., impulsivity, interpersonal sensitivity)
- Coping capacity (e.g., resilient coping style, social competence)
- Social networks & support (affiliative networks, confidants, attachment style)



# Analysis of Risk and Resilience Factors in the NSS (cont'd)

- The investigation of these linkages is critical in light of the fact that pre-enlistment mental disorders are so highly prevalent in the general population.
- This high prevalence means that Army cannot reject recruits from enlistment based on any but the most severe forms of mental disorder.
- Given this reality that a high proportion of new Soldiers have a history of mild or moderately severe mental illness, a plan is needed to develop interventions that target modifiable risk and resilience factors to reduce the impact of history of mental disorder on Soldier suicidality.
- Such an undertaking will be of great value in refining ongoing interventions, as well as developing new interventions to target the most critical aspects of Soldier resilience for intervention.

# Analysis of Risk and Resilience Factors in the NSS

- We already know from much previous research that prior suicidality (i.e., history of ideation, plans, and non-fatal attempts) is a powerful predictor of future suicides.
- We also know that mental disorders are powerful risk factors for suicidality.
- The NSS and AAS are collecting information on prevalence of both suicidality and the mental disorders known to be associated with suicidality as well as about a wide range of risk and resilience factors for suicidality and mental disorders.
- As a result, we are able to carry out retrospective (NSS) and cross-sectional analyses in the data to evaluate hypotheses about risk and resilience factors for suicidality and risk-resilience factors for these outcomes.

# Analysis of Risk and Resilience Factors in the NSS (cont'd)

- For example, the genetic data collected in the NSS will be used to evaluate a wide range of hypotheses about risk and protective factors with unprecedented statistical power in the large NSS database.
- In a similar way, we will be able to examine psychosocial risk and resilience factors for the same outcomes.
- Of particular importance to the Army, these analyses will be able to examine modifiable risk and resilience factors (e.g., modifiable cognitive schemas, coping dispositions, and interpersonal attachment styles) that mediate or modify the associations of mental disorders with suicidality.

# Analysis of Risk and Resilience Factors in the AAS

- The AAS is the main Army STARRS vehicle for obtaining information about risk and resilience factors from Soldiers that we do not assess in basic training.
- The survey collects information on suicidality and the mental disorders that are associated with suicidality.
- Information is also collected on treatment of mental disorders and barriers to treatment.
- Information is also collected on current stresses, supports, and unit cohesion.
- Although assessment of a comprehensive battery of risk and resilience factors like those in the NSS is beyond the scope of the AAS, we hope to do this in subsamples targeted for follow-up studies, most notably the PPDS.

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- As with SHOS-A, SHOS-B is retrospective. The results of SHOS-B will consequently be less definitive than those in the prospective analyses in which previously collected data from NSS or AAS are used to predict suicides.
- However, not all suicide completers will have previously been administered a NSS or AAS survey. As a result, the SHOS-B sample will include a larger number of suicides than those available for prospective analysis.
- Furthermore, SHOS-B results will be available much more quickly than those based on prospective analyses because we can study recent suicides and not have to wait to predict future suicides.
- In addition, the more in-depth data collection and assessment of pre-suicide triggers in SHOS-B will have the potential to document risk and protective factors that are not seen in the prospective surveys.
- Qualitative data collection from informants in SHOS-B will also help generate new hypotheses that can subsequently be tested prospectively by adding new measures to the ongoing surveys.



# Strengths and Limitations of SHOS-A

- Because SHOS-A is retrospective, results will be less definitive than those in the prospective analyses in which previously collected data from NSS and AAS are used to predict suicide attempts.
- However, not all suicide attempters will have previously completed a NSS or AAS survey. As a result, the SHOS-A sample will yield a larger number of attempters than those available for prospective analysis.
- Furthermore, SHOS-A results will be available much more quickly than those based on prospective analyses because we can study recent attempts and not have to wait to predict future attempts.
- In addition, the more in-depth data collection and assessment of pre-attempt triggers in SHOS-A have the potential to document risk and protective factors that are not seen in the prospective surveys.
- Qualitative data collection in SHOS-A will help generate new hypotheses that can subsequently be tested prospectively by adding new measures to the ongoing surveys.