Psychological Screening of Submariners:

The Development & Validation of the Submarine Attrition Risk Scale (SARS)

Presentation at IPMAAC
by
Dr. Mark N. Bing
SUBSCREEN Principal Investigator
co-author: CDR Eisenberg
Naval Submarine Medical Research Laboratory
Submarine Base New London

IRB Approval
NSMRL/ONR/BUMED

Relevant Facts on Navy-Wide Attrition
W. Farmer & D. Alderton, NPRST

- Approximately 40% of Navy recruits fail to complete their first enlistment. Annual financial loss is in tens of millions of dollars (per GAO).

- Psychological disorders are the leading cause of hospitalization in first 2 years of service (Accession Medical Standards Analysis and Research Activity, 1999).

- For active duty personnel between 1990-1999, 23% of all hospital bed days involved a mental disorder diagnosis (Hoge et al., 2002, American Journal of Psychiatry, 159, 1576-1583).

- Largest category of recruit attrition is "psychological."

Submarine Environment

- There are certain unique aspects to the working environment in a submarine..
  - No personal space whatsoever
  - No escape from workplace conflicts
  - No sunlight for long periods
  - Disrupted sleep/wake cycles and sleep deprivation
  - Concern for danger of excessive sea pressure
  - Concern for danger from enemy targets
- Socially intense, physically-closed, and potentially dangerous working environment
- <u>Conclusion</u> → The submarine environment demands psychological resilience to workplace stressors

Relevant Facts on Submarine Force Attrition

- Psychological dysfunction is an extremely large disqualifying category in the Submarine Force

- Misconduct is another very large category

- Substance abuse is also a large category

- 11th Hour Attritions $\rightarrow$ Manpower shortage

- These negative outcomes can be predicted using psychological screening, and thus some of them can be prevented

Prevention of Submariner Attrition

- Use the current psychological screening conducted on prospective submariners to identify those who are 'at risk' for attrition

- Use the 'at risk' information to improve
  - motivational intervention decisions
  - treatment decisions
  - separation decisions

Mandate for Psychological Screening of Prospective Submariners

- Mandate comes from a requirement of MANMED Article 15-69 para 2(i): "Because of the nature of the [submarine] duties, the psychological fitness of applicants for submarine training must be carefully appraised."

- NSMRL uses SUBSCREEN to meet this requirement

- SUBSCREEN is a standardized psychological screening tool used to identify prospective submariners with atypical mental health and motivational problems that interfere with adapting to the submarine environment

SUBSCREEN Test

- 240-item self-report questionnaire of environmental adaptability

- Current version developed in 1986

- 5 Major Dimensions
  - Procedural Scales (Faking, Extreme Responding)
  - Submarine Scales (Problems Submerging, Uncertain about Subs)
  - Affective Scales (Depressed Mood, Anxiety)
  - Socialization Scales (Aggressive-Destructive, Social Isolate)
  - Additional Scales (Suicidal Thoughts, Claustrophobic Feelings)

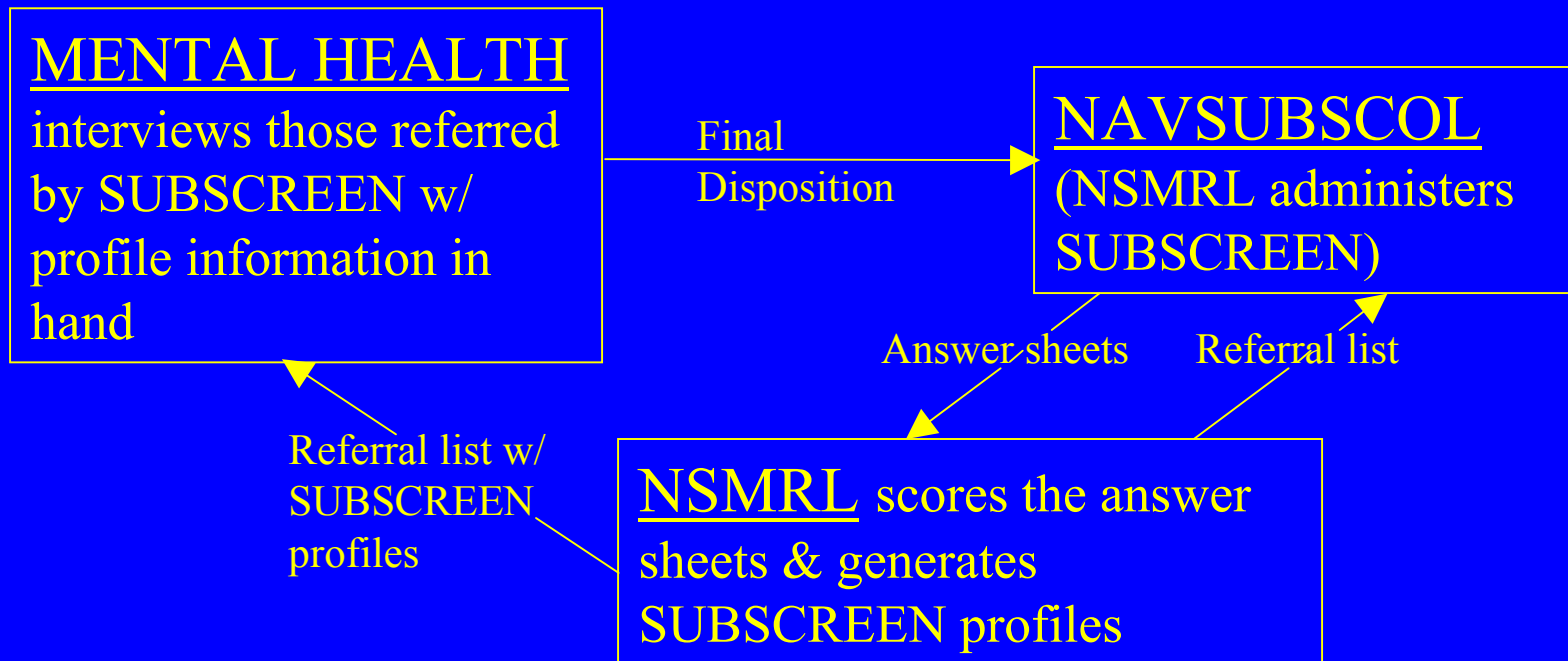- Database of 30,000 for norms of enlisted; 4,400 for officers

SUBSCREEN Process

- Every Week, Day 1of INDOC at BESS
  - NSMRL administers SUBSCREEN
  - NSMRL scores test & reports results for those needing referral
    - Names & SUBSCREEN Profiles sent to Mental Health Clinic
    - Names of those to be referred sent to BESS

- BESS schedules interviews with Mental Health Clinic
  - Mental Health conducts a mental health status interview on the SUBSCREEN referral
  - Mental Health sends recommendation outcomes to NSMRL & BESS
    - Three final dispositions (i.e., recommendations)

- SAME Process for SOBC except testing occurs every 6 weeks

SUBSCREEN Mission

- The results from SUBSCREEN are used to inform clinical judgment of the professional interviewer at the Mental Health Clinic regarding three possible recommendations, not intended as a substitute for such judgment

MENTAL HEALTH
interviews those referred by SUBSCREEN w/ profile information in hand

Final Disposition

NAVSUBSCOL
(NSMRL administers SUBSCREEN)

Referral list w/ SUBSCREEN profiles

Answer sheets

Referral list

NSMRL scores the answer sheets & generates SUBSCREEN profiles

Outcomes of the Current Screening & Referral System

- 10 of every 100 BESS students are referred by SUBSCREEN
  - 7 are recommended for return to BESS
  - 2 are recommended for ADSEP
  - 1 is recommended for Surface Fleet Transfer
- Conclusion → Current system removes approximately 3% of BESS students from the submarine training pipeline

Results of SUBSCREEN Referral System
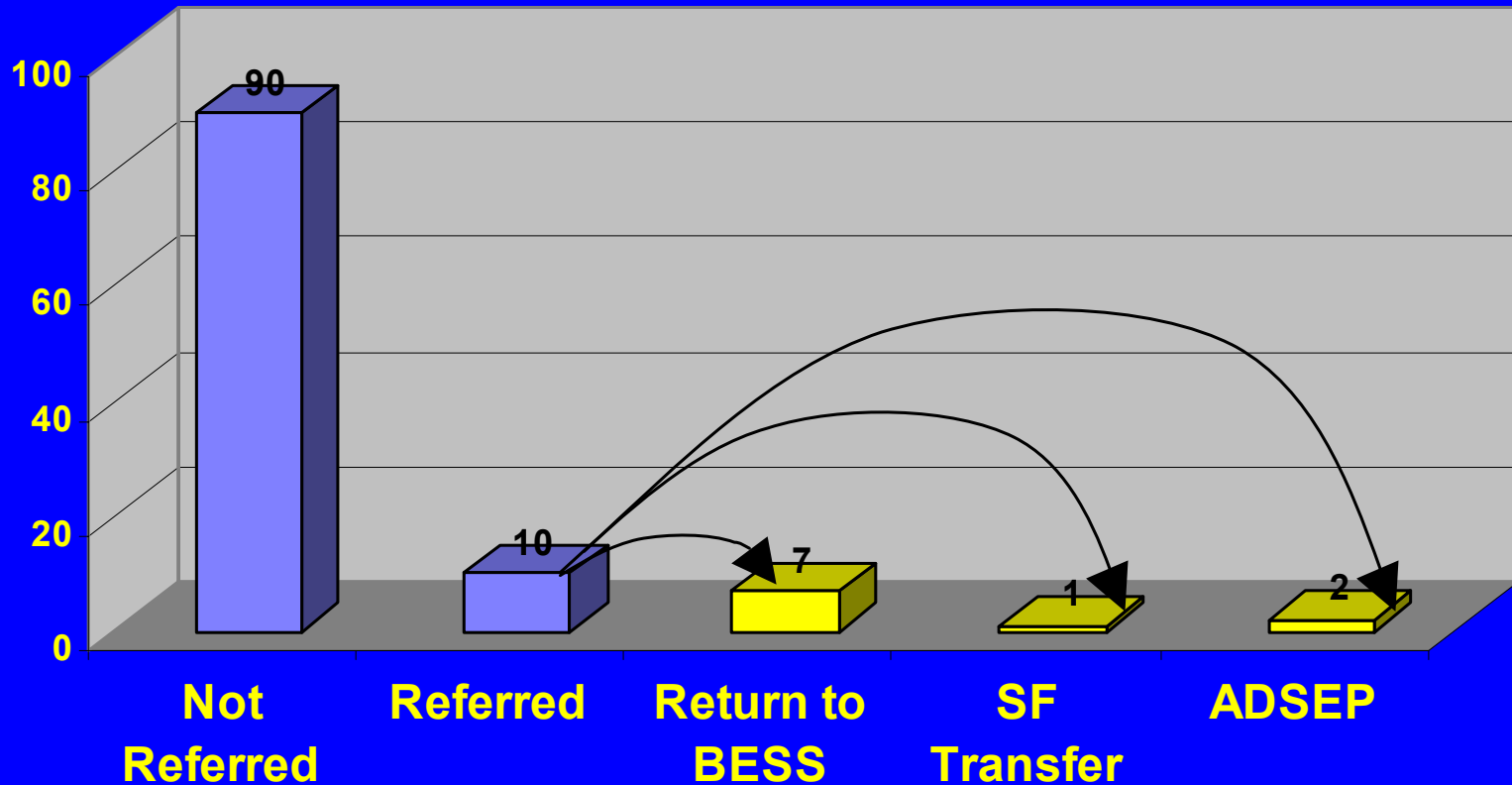
- <u>**Conclusion**</u> - Current system removes approximately 3% of BESS students from the submarine training pipeline

Ongoing Submarine Fleet Attrition Problems

- COMSUBPAC, 2001
  - 37% of all waivers & disquals were psychological
  - 14% of all MEDEVACS were psychologically-based
- COMSUBLANT, 2002, 10-month period
  - 12% of all MEDEVACS were psychologically-based
  - 3 of these events interrupted operations

New Direction to Improve Screening Effectiveness

- Identify those 'at risk' for negative fleet attrition

- Quantify the level of risk

- Scientifically-based identifier

- Use the 'at risk' information to improve motivational, training, placement, and separation decisions made at BESS <u>prior to fleet entry</u>

Development of Submarine Attrition Risk Scale (SARS)

- Built a database of several thousand successful and unsuccessful fleet submariners who had taken SUBSCREEN

- Successful →
  - LOS ranged from 4.25 to 22 years
  - All reenlisted
  - E4 to E9 (avg. rank E5)

- Unsuccessful →
  - Disqualified and separated for substance abuse, misconduct, and/or psychological dysfunction
  - Avg. LOS 14 months (none reenlisted)
  - Avg. Rank, E2 (none above E4)

- Discriminant analysis produced an optimal linear composite of SUBSCREEN subscales that accurately categorized these groups, and this linear composite was termed SARS

Test Performance Characteristics

- Hit Rate → The percentage of all persons identified as 'at risk' for attrition that eventually do attrite for negative cause

- False Positive Rate → 1 - Hit Rate, or the percent of those incorrectly identified as 'at risk' because they become successful submariners

- Sensitivity → The percentage of all persons defined as 'unsuccessful' submariners who were identified as 'at risk' for attrition by the test

SARS: Performance Characteristics
(Retrospective, Development Study)

- Our initial cut-point on the SARS (+.85 *SD*) resulted in...
  - Hit Rate = 70%; if 'flagged' by SARS the submariner had a 70% chance of early and negative separation from fleet
  - Sensitivity = 20%; of all the negative fleet separations, SARS identified 20% of them as 'at risk' for attrition, or 1 out of 5
  - Correlation between SARS (continuous) scores and attrition (i.e., successful vs. unsuccessful) was .25 (*p* < .001)

Cross-Validation of SARS with Legal Holds
(Prospective Study)

- Obtained data on 47 BESS (negative) legal holds

- Calculated SARS performance characteristics in prediction of legal holds for cross-validation
  - Sensitivity = 50%; for the entire group of legal holds, 1 in 2 was identified as 'at risk' for attrition by the SARS
  - Hit Rate = 89%; in comparison to a randomly selected group of successful submariners, those identified as 'at risk' by the SARS had an 89% probability of becoming a BESS legal hold
  - Correlation between SARS (continuous) scores and legal hold status was .50 ($p < .001$)

Cross-Validation of SARS with Masts (Prospective Study)

- Obtained data on 180 Mast (NJP) cases at BESS

- Calculated SARS performance characteristics in prediction of NJP

    – Sensitivity = 32%; 1 in 3 of those who went to NJP was identified as 'at risk' for attrition by SARS

    – Hit Rate = 74%; in comparison to a randomly selected group of successful submariners, BESS students identified as 'at risk' by the SARS had a 74% probability of going to Mast

    – Hit Rate = 70%, in comparison to a randomly selected group of BESS students who DID NOT go to Mast, BESS students identified as 'at risk' by the SARS had a 70% probability of going to Mast

    – Correlation between SARS (continuous) scores and NJP was .35 ($p <$ .001) when using successful submariners as the comparison sample

Cross-Validation of SARS with Psychologically-Based MEDEVACS
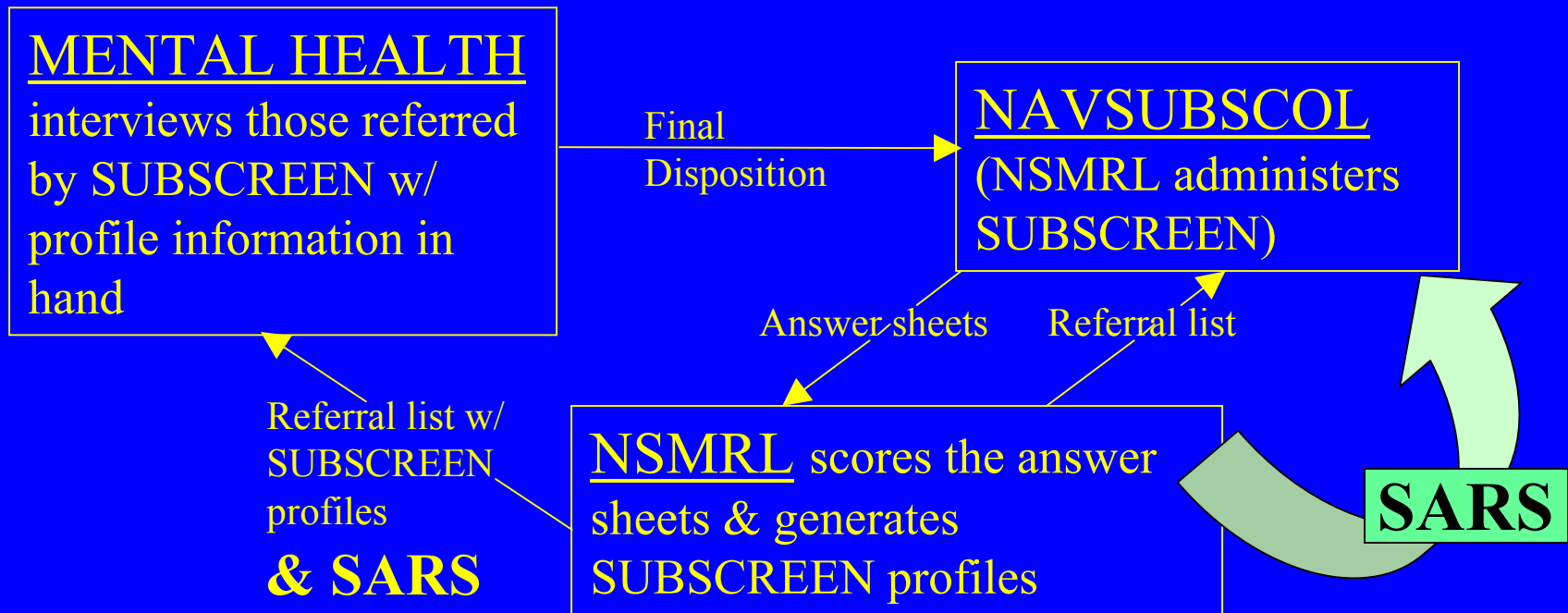## (Prospective Study)

- Obtained data on 13 SUBLANT Psychologically-Based MEDEVACS

- We found SUBSCREEN Profiles for 7 of the 13
  - some were Nukes, & we do not screen enlisted Nukes
  - some went through BESS prior to implementation of SUBSCREEN

- Calculated SARS performance characteristics in prediction of Psychologically-Based MEDEVACS
  - Sensitivity = 29%; almost 1 in 3 of the MEDEVACS were identified as 'at risk' for attrition by SARS
  - Sensitivity increased to 86% when using the cut-point on the SARS that we intended to use for its implementation as a 'decision aid' when released to the trainers at BESS directly

Implementation of the SARS

- SARS could be used as a scientific foundation for professional training decisions (e.g., discharge, transfer to surface fleet, intervene to increase motivation) made on submariners
  - These decisions must be made anyway, thus a scientifically sound decision aid would be helpful
  - Many benefits, such as an early identification of those 'at risk,' an early intervention, and a reduction in attrition and misconduct

New SUBSCREEN Mission

- The results from SARS (the % chance of negative disqualification) COULD be used to inform NAVSUBSCOL judgment when…
  - Deciding whether or not a BESS student should stay within the submarine training pipeline
  - Targeting a motivational intervention to those 'at risk' to build up their resilience and prevent their attrition

MENTAL HEALTH interviews those referred by SUBSCREEN w/ profile information in hand

Final Disposition

NAVSUBSCOL (NSMRL administers SUBSCREEN)

Answer sheets

Referral list

Referral list w/ SUBSCREEN profiles **& SARS**

NSMRL scores the answer sheets & generates SUBSCREEN profiles

SARS

Projected Savings from Mission Accomplishment

- The current, 70% hit-rate cut-point (+.85 *SD*) flags about 16% of BESS students, 70% of whom are 'at risk' for negative attrition

- Assuming a mean of 2500 BESS students a year, this cut-point identifies 400 (2500 x .16) as 'at risk,' 280 (400 x .70) of whom would likely attrite for negative cause before completing their 1st enlistment

- Assuming a motivational intervention targeted to those 'at risk' would successfully retain only 33% of these 280 students (i.e., 92), and thus prevent 92 of them from disqualifying and separating when they reach the fleet, then…

Projected Savings from Mission Accomplishment

- In terms of Advanced (A) School (e.g., sonar tech school) Training Dollars…
  - 92 (i.e., 33% of 280) x $60,000 = <u>$5,520,000</u> a year in saved training dollars
  - 30 (assume only about 1/3rd of the 92 go to A School) x $60,000 = <u>$1,800,000</u> a year in saved training dollars
- These dollars are saved because they are spent on training submariners that successfully complete their 1st enlistment, instead of disqualifying and separating for negative cause

Projected Performance Benefits

- Reduction in 11th hour attritions

- Maintenance of required manpower levels on submarines

- Improved operational readiness

- Reduction in operation disruptions by preventing psychologically-based MEDEVACS

- In sum, these efforts support CNO's attrition-reduction initiatives and answers GAO recommendations for better personnel screening

Current Military/National Climate

- Navy re-enlistment is at a near all-time high (72% as opposed to ≈ 40% in previous years)
  - Economic recession with fewer job opportunities
  - Increase in patriotic attitudes
- Intensity and frequency of submarine operations has increased along with special operations
  - Increases stress in submarine working environment, and the possibility of negative attrition, misconduct, etc.
- Current military situation is conducive to being more selective, and perhaps to "selecting out" from submarine training more of those likely to attrite according to the Submarine Attrition Risk Scale (SARS)