

THE ENTRY PSYCHIATRIC SCREEN (EPS): A PSYCHIATRIC SCREENING PROCEDURE FOR APPLICANTS FOR MILITARY SERVICE

Mark E. Koltko-Rivera*
Professional Services Group, Inc.
PO Box 4914, Winter Park, Florida 32792-4914

LTC David W. Niebuhr, MD, MPH
Accession Medical Standards Analysis and Research Activity (AMSARA)
Division of Preventive Medicine, Walter Reed Army Institute of Research
503 Robert Grant Road (2S34), Silver Spring, Maryland 20910-7500

ABSTRACT

Premature attrition is a significant problem in the military, with an impact on available forces, and on expenses for accession and training. A significant proportion of premature attrition is due to undetected psychiatric conditions, present at entry into the armed forces. However, in-depth psychiatric interviews of all potential recruits presents an impractical solution. It would be desirable to have a psychiatric screen to use before or after induction. Such a screen would highlight the need to present certain individuals for further psychiatric evaluation. This presentation reports data regarding the convergent and concurrent criterion-related validity of a prototype of one such screen, the Entry Psychiatric Screen (EPS) V.1, which screens for anxiety, depression, mania, psychosis, and antisocial tendencies. Data gathered from over 400 induction-age college students indicates that the scales of the EPS demonstrate adequate convergent validity. In addition, the scales of the EPS were either as good as or superior to several commercially available instruments, in terms of dividing participants into subgroups who either had or did not have a history of psychiatric diagnosis.

1. INTRODUCTION

1.1. Premature Attrition from the Military

Premature attrition is a significant problem in the military. In the late 1990s, a report on military attrition commissioned by Congress noted that in the decade preceding the report, "about one-third of enlistees in the military services ... failed to complete their first terms of duty"; as an example of attrition occurring early in term of duty, of over 176,000 individuals recruited by DoD in FY 1994, over 25,000 (14%) were separated from the military services within the first 6 months of their contracts (U.S. General Accounting Office, 1997, p. 2).

Psychiatric conditions that are present at enlistment but undetected are a significant cause of premature attrition from military service. During the period 1995-2000, taking all branches of the armed services as a group, psychiatric disorders were the number one cause of existed prior to service (EPTS) medical discharges; psychiatric disorders accounted for over 24% of all EPTS discharges during this period (calculated from figures reported in AMSARA, 2002, p. 34).

Discharges related to psychiatric conditions are especially noteworthy among those who have been hospitalized for psychiatric disorders. During the period 1998-1999, of all new military accessions, 2.2% were hospitalized within the first 6 months on active duty; of these hospitalizations, 40% were attributable to psychiatric conditions (reported in and calculated from figures reported in AMSARA, 2003, pp. 28-30). Of those whose hospitalizations were attributable to psychiatric conditions, 89% left military service within the first six months after hospitalization (AMSARA, 2003, p. 30).

In turn, premature attrition not only results in significant manpower losses to the military, but also causes significant monetary losses to the armed forces. The EPTS discharges in 1998 referred to above (of which about 30% were due to psychiatric conditions), reportedly "cost the military more than an estimated \$27.3 million ... in recruiting and accession costs alone" (U.S. Department of Defense, 2001, p. OSD-8). It has been estimated by different methods that reduction of overall military attrition by 4% to 10% in any given year would result in immediate short-term annual savings of \$5 million to \$12 million, and long-term savings of \$15 million to \$39 million (U.S. General Accounting Office, 1997, p. 2).

Although these figures are somewhat discrepant, it is clear that the prevention of premature attrition due to psychiatric disorder would have a major impact both on number of available personnel and on budgetary cost

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savings (the latter figuring into the tens of millions of dollars annually).

1.2. Screening for Psychiatrically Based Likelihood for Premature Attrition from the Military

There are two ways to prevent premature attrition due to psychiatric disorder:

1. Prevent individuals with major psychiatric disorder from entering military duty without treatment.
2. Detect the existence of the early stages of major psychiatric disorder among active duty personnel, and provide appropriate intervention, both to prevent the full-blown development of major psychiatric disorder, and to retain these personnel in the military at an appropriate state of readiness for duty.

Each of these methods of attrition prevention requires some way to assess major psychiatric disorders. What is required is a screening procedure, rather than full-blown diagnostic procedures (which are available, but too expensive and time-consuming to administer to all recruits; see below). A screening procedure would identify, from among all potential recruits or new inductees, those who are likely to pose a strong risk of attrition due to psychiatric disorder, and who therefore should receive more in-depth psychodiagnostic assessment (e.g., clinical interview) by qualified professionals (such as psychologists or psychiatrists), preparatory to appropriate intervention. This type of two-step, screening-then-interview approach has long been recommended in professional psychology; it has been noted that this approach not only yields cost advantages, but also is likely to yield more valid results than either a sequence of two different psychological tests or even a sequence of two clinical interviews (Butcher & Finn, 1983, p. 331).

Considerations of practicality in a military context require that this screening procedure be inexpensive, easy to administer, appropriate for administration to large numbers of individuals, and interpretable by physicians without specialty training in psychiatry. As it happens, most available screening procedures are lacking in one or more of these characteristics. For example, the second edition of the *Minnesota Multiphasic Personality Instrument* (or MMPI-2; see Graham, 2000) consists of 567 questionnaire items. Administration is thus somewhat time-consuming. In addition, interpretation requires both computerized scoring and special training.

Considerations of utility require that that a screening procedure be reliable (i.e., the same individual should

receive the same rating on different occasions). The screening procedure should also be standardized (i.e., the performance of a large number of typical people should be recorded and described, so that an individual's performance can be readily compared to one or more comparison groups, such as those with and without a given diagnosis).

Most importantly, the screening procedure should be valid. For our purposes, the construct validation of a screening procedure must be addressed in several ways (Pedhazur & Schmelkin, 1991). The procedure must demonstrate *concurrent criterion-related validity*, in that individuals scoring above a certain threshold should be much more likely to have an actual major psychiatric disorder than individuals scoring below threshold. Related to this, we expect the procedure to demonstrate *convergent validity*, in that scores on the experimental screening procedure should correlate positively with corresponding scores on established instruments. And, especially, the procedure must demonstrate *predictive criterion-related validity*, in that individuals scoring above a certain threshold on the screen should be much more likely to experience psychiatrically based early attrition from the military than individuals scoring below threshold.

1.3 AMSARA's Psychiatric Screen Program

In response to this need to detect psychiatric conditions before basic training, the Accession Medical Standards Analysis and Research Activity (AMSARA), within the Division of Preventive Medicine at the Walter Reed Army Institute of Research, proposed a Small Business Initiative Research project focused on the development of a rapid, inexpensive method to screen all military recruit applicants for major psychiatric disorders such as affective disorders, anxiety disorders, somatoform disorders, and attentional disorders. Two phase I grants were funded in calendar year 2001, and two instruments were developed as part of these grants, focusing on concurrent criterion-related validity. Beginning in calendar year 2002, two companies were funded for phase II studies. Phase II will evaluate the screening method in a young military population for its ability to predict current and future psychiatric disorders (thus focusing on predictive criterion-related validity).

The remainder of this report reports the Phase I results regarding one such screening procedure under development, a self-report instrument, the Entry Psychiatric Screen, the first release of which screens for symptoms of anxiety, depression, mania, and antisocial tendencies. Although proprietary concerns prevent us from discussing item content or test development procedures, in this report we describe the convergent and concurrent criterion-related validity of the EPS 1.0,

relative to commercially available instruments, using an induction-age college sample.

2. DESIGN OF THE PHASE I VALIDATION STUDY

We conducted a psychometric instrument development study. Participants included over 400 induction-age college students at the University of Central Florida.

The paper-and-pencil instrumentation package administered to our sample included: [1] the Entry Psychiatric Screen (EPS), the experimental instrument at the focus of the Phase I research; [2] the Personality Assessment Inventory (PAI), a multidimensional measure of psychopathology (Morey, 1991); [3] the Revised Symptom Checklist-90 (SCL-90-R), a multidimensional checklist of symptoms of psychopathology (Derogatis, 1994); and, [4] the Revised NEO Personality Inventory (NEO PI-R), a measure of normal personality with measures of depression and anxiety (Costa & McCrae, 1992). Between 387 and 408 induction-age college students completed the EPS and at least one of the other instruments, varying across comparison instruments.

In addition, with a subset of the sample, we administered two one-on-one psychodiagnostic interviews, including the Structured Clinical Interview for DSM-IV-TR (First, et al., 2001) and the Hare Psychopathy Checklist (Hart, Cox, & Hare, 1995). In total, 96 induction-age college students were administered both the full instrumentation package and the diagnostic interview.

3. RESULTS

3.1 Convergent Validity

The idea behind convergent validity is that a new instrument should correlate with established instruments that assess the same construct. It is not to be expected that such correlations will be perfect, however, even under the best of circumstances, because of slightly different focuses between instruments. In this instance, the EPS is designed to be especially sensitive to extremes, that is, to “pick up” individuals who manifest more serious symptoms of psychopathology; most other instruments are designed to show smooth graduations in score distributions for different syndromes or personality traits. Consequently, we expected to see moderate correlations between the EPS scales and corresponding scales on other instruments.

EPS Anxiety Scale

Correlations between the EPS Anxiety Scale and corresponding scales of comparison instruments are shown in Table 1.

Scale	2	3	4	5
1. EPS Anxiety	.64	.59	.52	.56
2. PAI Anxiety	—	.73	.61	.70
3. PAI Anx.-Rel.		—	.53	.57
4. SCL Anxiety			—	.46
5. NEO Anxiety				—

Note. For all correlations, $p < .001$ (one-tailed). Sample sizes varied from $N = 387$ to $N = 408$. EPS: Entry Psychiatric Screen. PAI: Personality Assessment Inventory. SCL: Symptom Checklist 90-Revised. NEO: NEO Personality Inventory-Revised.

Table 1: EPS Anxiety Scale Convergent Validity Data

The correlations between the EPS Anxiety Scale and the other scales assessing anxiety were, in three out of four cases, above .50, or in the “high” range as defined by Cohen (1988, 1992); in the fifth case, the correlation (.4) was between the “medium” and “high” ranges as so defined. Thus, the EPS Anxiety Scale correlated in the predicted direction, and at an appropriate magnitude, with four other measures of anxiety.

EPS Depression Scale

Correlations between the EPS Depression Scale and corresponding scales of comparison instruments are shown in Table 2.

Scale	2	3	4	5
1. EPS Depression	.66	.55	.51	.56
2. PAI Depression	—	.65	.60	.65
3. PAI Suicidality		—	.40	.46
4. SCL Depression			—	.57
5. NEO Depressn.				—

Note. For all correlations, $p < .001$ (one-tailed). Sample sizes varied from $N = 387$ to $N = 408$. EPS: Entry Psychiatric Screen. PAI: Personality Assessment Inventory. SCL: Symptom Checklist 90-Revised. NEO: NEO Personality Inventory-Revised.

Table 2: EPS Depression Scale Convergent Validity Data

The correlations between the EPS Depression Scale and the other scales assessing depression were, in all cases, above .50, or in the “high” range as defined by Cohen (1988, 1992). Thus, the EPS Depression Scale correlated in the predicted direction, and at an appropriate magnitude, with three other measures of depression.

EPS Mania Scale

Correlations between the EPS Mania Scale and other scales assessing mania and manic-like characteristics are shown in Table 3.

Scale	2	3
1. EPS Mania	.251***	.092*
2. PAI Mania	—	.291***
3. SCL Hostility	—	—

Note. Sample sizes varied from $N = 387$ to $N = 408$. EPS: Entry Psychiatric Screen. PAI: Personality Assessment Inventory. SCL: Symptom Checklist 90-Revised. NEO: NEO Personality Inventory-Revised.

* $p < .05$. *** $p < .001$.

Table 3: EPS Mania Scale Convergent Validity Data

The correlations between the EPS Mania Scale and other scales assessing mania were all positive and statistically significant. Thus, the EPS Mania Scale correlated in the predicted direction, and statistically significantly, with two other measures of mania or manic-like characteristics.

EPS Psychosis Scale

As compared to the situations involving the anxiety or depression diagnostic categories, the lack of significant numbers of participants in this research project with a history of psychosis suggests that we will encounter what is technically referred to as problems with range restriction (Pedhazur & Schmelkin, 1991). As applied to this situation, the problem of range restriction means that the extremely low degree of psychosis present in the sample will tend to depress the level of correlations we see between instruments assessing psychotic characteristics, leading us to underestimate the strength of the relationship between these instruments’ scores, for even the best of assessment instruments.

As a result of these factors, we would not expect to see the same level of correlation between these instruments as we saw for the assessment of anxiety or

depression, although we would expect to see positive correlations that were statistically significant.

Scale	2	3	4	5
1. EPS Psychosis	.24	.29	.13	.23
2. PAI Paranoia	—	.62	.52	.36
3. PAI Schizophr.	—	—	.40	.40
4. SCL Paranoid	—	—	—	.74
5. SCL Psychotic	—	—	—	—

Note. For all correlations but one, $p < .001$ (one-tailed); for the correlation between EPS Psychosis and SCL Paranoid, $p < .01$. Sample sizes varied from $N = 391$ to $N = 408$. EPS: Entry Psychiatric Screen. PAI: Personality Assessment Inventory. SCL: Symptom Checklist 90-Revised.

Table 4: EPS Psychosis Scale Convergent Validity Data

Correlations between the EPS Psychosis Scale and the other scales assessing psychotic characteristics are shown in Table 4. The correlations between the EPS Psychosis Scale and the other scales assessing psychosis were all positive and statistically significant. The magnitudes of most of these correlations were between the “small” and “medium” effect size ranges defined by Cohen (1988, 1992); the correlation with the PAI Schizophrenia index was in the “medium” range. Thus, the EPS Psychosis Scale correlated in the predicted direction, statistically significantly, and to a moderate degree, with four other measures of psychotic characteristics.

EPS Antisocial Scale

Here again, the lack of participants in our sample who manifested clinical levels of psychopathy meant that we would encounter a range restriction problem. Consequently, we expected to see low to moderate levels of correlation between the EPS Antisocial Scale and other relevant comparison scales.

Correlations between the EPS Antisocial Scale and other scales assessing antisocial characteristics are shown in Table 5. These correlations are all positive and statistically significant. In fact, the correlation between the EPS Antisocial Scale and the most stable of the other measures, the PAI Antisocial Features index, was in the “large” range for effect size in a correlation, as defined by Cohen (1988, 1992). These findings are particularly striking, given our expectations regarding depressed correlations due to range restrictions. Thus, the EPS Psychosis Subscale correlated in the predicted direction,

and with appropriate magnitude, with four other measures of psychotic characteristics.

Scale	2	3	4	5
1. EPS Antisocial	.39	.41	.37	.47
2. PAI Antisocial Behaviors	—	.48	.51	.85
3. PAI Egocentricity.		—	.49	.77
4. PAI Stimulus-Seeking			—	.81
5. PAI Antisocial Features (totaling #2-#4 above)				—

Note. For all correlations, $p < .001$ (one-tailed). Sample sizes varied from $N = 391$ to $N = 408$. EPS: Entry Psychiatric Screen. PAI: Personality Assessment Inventory.

Table 5: EPS Antisocial Scale Convergent Validity Data

3.2 Concurrent Criterion-Related Validity I: Correlations to Discriminant Functions

Results from the SCID interviews revealed that no members of our sample met the criteria for a psychotic disorder. Results for the Hare Psychopathy Checklist revealed that no members of our sample met the criteria for clinical psychopathy. For each of the three remaining diagnostic categories under consideration—*anxiety, depression, and mania*—the SCID interview allowed us to divide our sample into two groups: (1) those who had ever demonstrated some psychiatric syndrome within that category; and, (2) those who had never demonstrated such a syndrome. Thus, membership in these groups became a criterion; the ability to distinguish between these two groups was thus a measure of criterion-related validity.

One approach to criterion-related validity involves a statistical technique known as discriminant analysis. This technique creates a mathematical equation that uses given information to attempt to correctly categorize cases into each of the groups of interest. Information from discriminant analysis tells us how good a given piece of information is when it comes to distinguishing between groups.

EPS Anxiety Scale. A discriminant analysis of cases with a history of some anxiety disorder, using the EPS Anxiety Scale as sole predictor (Wilks' Lambda = .81, p

$< .001$), suggested that, with a large number of cases, 85.3% of cases would be correctly classified. Thus, the EPS Anxiety Scale was efficient as a sole predictor of a history of some anxiety disorder.

EPS Depression Scale. A discriminant analysis of cases with a history of some depressive disorder, using the EPS Depression Scale as sole predictor (Wilks' Lambda = .87, $p < .001$), suggested that, with a large number of cases, 82.3% of cases would be correctly classified. Thus, the EPS Depression Scale was efficient as a sole predictor of a history of some depressive disorder.

EPS Mania Scale. A discriminant analysis of cases with a history of Bipolar Disorder II, using the EPS Mania Scale as sole predictor (Wilks' Lambda = .95, $p = .035$), suggested that, with a large number of cases, 97.9% of cases would be correctly classified. Thus, the EPS Mania Scale was efficient as a sole predictor of a history of Bipolar Disorder II.

3.3. Concurrent Criterion-Related Validity II: Effect Size Comparisons

Another approach to criterion-related validity involves scale score differences shown between the two groups. We expected that each of the four paper-and-pencil instruments would show differing scores for each syndrome; this would be an indication, to a greater or lesser extent, of concurrent criterion-related validity (the criterion here referring to diagnostic history status). We gathered data to address the issue of which of these instruments would show the *greatest* difference between the ever-diagnosed and never-diagnosed groups.

The greater the difference of test scores between ever-diagnosed and never-diagnosed groups, the stronger the demonstration of criterion-related validity. The magnitude of the intergroup difference is technically called the *effect size*, for which we used the statistic known as Cohen's d (basically the quotient of the group differences divided by the pooled standard deviation; Cohen, 1988, pp. 20-21; see also Cohen, 1992).

The effect sizes for the test score difference between ever-diagnosed and never-diagnosed groups, for each of the paper-and-pencil instruments, is given in Table 6. As shown in this table, the EPS showed the largest effect size of any of the instruments used, for depressive and bipolar diagnoses. The EPS and the NEO PI-R tied for the largest effect size for anxiety diagnoses.

4. DISCUSSION

The EPS appears to be a valid instrument for the purpose of identifying individuals who have a history of anxiety, depression, or mania. In addition, the EPS was more efficient at identifying such individuals than currently available psychodiagnostic instruments, for the most part. Phase II research is currently underway using a later version of the EPS (including indicators of psychosis, antisocial tendencies, somatization, and cognitive dysfunctions) in a predictive criterion-related validation study with actual military recruits.

We are interested in discussing the use of the EPS in connection with military entry or operational environments. The first author on this paper may be contacted at mark@professionalservicesgroup.net.

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Diagnostic Category	n ^b	Effect Size ^a (Cohen's <i>d</i>)			
		EPS	PAI	SCL	NEO
All Anxiety Diagnoses	13	1.40	1.21	1.15	1.40
All Depressive Diagnoses	19	0.96	0.88	n.s. ^c	0.85
All Bipolar Diagnoses	2	1.55	0.24	n.s. ^c	-- ^d

“EPS” = Entry Psychiatric Scale Release Version 1; “NEO” = Revised NEO Personality Inventory; “PAI” = Personality Assessment Inventory; “SCL” = Revised Symptom-Checklist-90.

^aThe effect size referred to is the size of the “effect” of having a history of psychiatric diagnosis, versus not having such a history.

^bSample sizes are number of individuals, of 97, falling within the “ever diagnosed” group for any DSM-IV-TR diagnosis within the category indicated.

^cThe SCL-90-R did not show significant differences between the ever-diagnosed and never-diagnosed groups, for either the composite depressive category or the composite bipolar category.

^dThe NEO PI-R does not have a facet score corresponding to mania.

Table 6: Concurrent Criterion-Related Validity Data