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

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## 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 soon after induction. Such a screen would highlight the need to present certain individuals for further psychiatric evaluation. This presentation reports data regarding the discriminant, 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 discriminant and convergent validity. In addition, the scales of the EPS were either as good as or superior to several commercially available instruments, in terms of distinguishing participants 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)
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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 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 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). 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 specialized training.

Considerations of utility require that this 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). In particular: (1) 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; (2) the procedure should demonstrate *discriminant validity*, in that scores on the experimental screening procedure should not correlate strongly with measures of irrelevant qualities (such as the tendency to respond in a socially desirable way); (3) 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; (4) especially important, 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 convergent validity, discriminant validity, and concurrent criterion-related validity. Beginning in calendar year 2003, 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 presentation 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 discriminant, 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 multi-dimensional checklist of symptoms of psychopathology (Derogatis, 1994); [4] the Revised NEO Personality Inventory (NEO PI-R), a measure of normal personality with measures of depression and anxiety (Costa & McCrae, 1992); and, [5] the Marlowe-Crowne Social-Desirability Scale (M-C Scale), a measure of the tendency to respond in a socially desirable fashion (Crowne & Marlowe, 1964). Between 387 and 414 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 (SCID; First, et al., 2001) and the Hare Psychopathy Checklist (PCL; 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 Discriminant Validity

Sometimes instruments intended to measure one quality actually measure, to a large extent, another quality altogether. For example, a test of mathematical ability based on word problems may actually measure verbal intelligence to some extent, because verbal intelligence is necessary to understand the problems. In the psychiatric realm, one important confounding characteristic is social desirability response set, that is, the tendency to respond in a socially desirable fashion (Crowne & Marlowe, 1964). This is an issue because psychiatric disorder is inherently socially undesirable in our society. Consequently, it is important to see the extent to which psychiatric instruments correlate with a measure of social desirability response set, such as the M-C Scale. Correlations between the M-C Scale and scales of the clinical instruments are shown in Table 1.

| | Clinical Instrument | | | |
|---|---|---|---|---|
| Scale | EPS | PAI | SCL | NEO |
| Anxiety | .101* | .112* | .078 | .087* |
| Depression | .037 | .122** | .076 | .160** |
| Mania | .146** | .090* | -- | -- |
| Psychosis | .181*** | .115*[a] | .117** | -- |
| Antisocial | .087* | .101* | -- | -- |

*Note.* Sample sizes varied from $N = 391$ to $N = 414$. EPS: Entry Psychiatric Screen. PAI: Personality Assessment Inventory. SCL: Symptom Checklist 90-Revised. NEO: NEO Personality Inventory-Revised. "--" = No corresponding scale exists within the noted instrument.
[a] The PAI Schizophrenia total raw score was used here.
*$p < .05$; **$p < .01$; ***$p < .001$ (all one-tailed).

Table 1: Correlations Between the Marlowe-Crowne Scale and Clinical Instruments

As shown in Table 1, none of the clinical instruments used in the present study correlated even to the .20 level with the M-C Scale. Thus, all the clinical instruments demonstrated adequate discriminant validity with respect to social desirability response tendency.

### 3.2 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" and distinguish among 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 correlations between the EPS scales and corresponding scales on other instruments that were moderate, that is, in the .20 to .40 range, thus centered around the criterion used to define the "medium" effect size for correlations as defined by Cohen (1988, 1992).

*EPS Anxiety Scale*

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

| 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 2: EPS Anxiety Scale Convergent Validity Data

The correlations between the EPS Anxiety Scale and the other scales assessing anxiety were, in all four cases, between .50 and .65, or in the "high" range as defined by Cohen (1988, 1992). Thus, the EPS Anxiety Scale correlated in the predicted direction, and at a magnitude that exceeded expectations, 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 3.

| 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 3: 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 a magnitude that exceeded expectations, with three other measures of depression, and one of suicidality.

*EPS Mania Scale*

Correlations between the EPS Mania Scale and other scales assessing mania and manic-like characteristics are shown in Table 4.

| 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 4: EPS Mania Scale Convergent Validity Data

The correlations between the EPS Mania Scale and other scales assessing mania were both positive (the predicted direction) and statistically significant. The correlation with the PAI Mania Scale was within expected parameters. The relatively low correlation with the SCL Hostility Scale may be due to the fact that hostility is not always present in mania.

*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 (as revealed by SCID interview) suggested that we would 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 would 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.

Thus, 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. Correlations between the EPS Psychosis Scale and the other scales assessing psychotic characteristics are shown in Table 5.

| 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 5: EPS Psychosis Scale Convergent Validity Data

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 within the expected range. Thus, the EPS Psychosis Scale correlated in the predicted direction, statistically significantly, and to a moderate degree, with three of four other measures of psychotic characteristics.

*EPS Antisocial Scale*

Here again, the lack of participants in our sample who manifested clinical levels of psychopathy (as revealed by PCL interview) 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 6. These correlations are all positive, statistically significant, and in the medium-to-high range, as defined by Cohen (1988, 1992). These findings are particularly striking, given our expectations regarding depressed correlations due to range restrictions. Thus, the EPS Antisocial Scale correlated in the predicted direction, and with a magnitude exceeding expectations, 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 6: EPS Antisocial Scale Convergent Validity Data

### 3.3 Concurrent Criterion-Related Validity I: Correlations to Discriminant Functions

As mentioned earlier, results from the SCID and PCL interviews revealed that no members of our sample met the criteria for a psychotic disorder or clinical psychopathy. For each of the other 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 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 to 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 monopolar 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 monopolar 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.

### 3.4. Concurrent Criterion-Related Validity II: Effect Size Comparisons

Another approach to criterion-related validity involves mean scale score differences shown between the two groups. The greater the difference of average 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* (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 7. 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. Thus, the EPS was at least as good as the other instruments in the study (and was usually better than these other instruments) at distinguishing between participants who had ever been diagnosed with depression, mania, or anxiety, and those who had never been so diagnosed.

One way to illustrate the difference in effect sizes is to show the way in which the score distributions differ, for ever-diagnosed versus never-diagnosed groups. This is shown in Figure 1 (see last page) for history of depression. The score distributions in red are for the "never diagnosed" group, that is, those who have never been diagnosed with depression, as revealed by the SCID interview. The score distributions in green are for the "ever-diagnosed" participants, that is, those who at some time in their lives fit the criteria for some monopolar depressive disorder (major depression, dysthymic disorder, or depressive disorder not otherwise specified), as revealed by the SCID interview. (Rough curve-approximations have been sketched in over the score distributions.) The ideal psychiatric screen would show no overlap between the score distributions of the never-diagnosed and ever-diagnosed groups, while the worst psychiatric screen would show complete overlap between the score distributions of these groups. As shown in Figure 1, although the EPS was not ideal, it seemed to show less overlap than the comparison instruments. Thus, the EPS seems to be a relatively more efficient way to distinguish between ever-diagnosed and never-diagnosed groups for depression.

| | | Effect Size[a] (Cohen's *d*) | | | |
|---|---|---|---|---|---|
| Diagnostic Category | n[b] | EPS | PAI | SCL | NEO |
| Anxiety Diagnoses | 13 | 1.40 | 1.21 | 1.15 | 1.40 |
| Depressive Diagnoses | 19 | 0.96 | 0.88 | n.s.[c] | 0.85 |
| 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.

[a]The effect size referred to is the size of the "effect" of having a history of psychiatric diagnosis, versus not having such a history, on scale scores.

[b]Sample sizes are number of individuals, from an interviewed population of 97, falling within the "ever diagnosed" group for any DSM-IV-TR diagnosis within the category indicated.

[c]The SCL-90-R did not show statistically significant differences between the ever-diagnosed and never-diagnosed groups, for either the composite depressive category or the composite bipolar category.

[d]The NEO PI-R does not have a facet score corresponding to mania.

Table 7: Concurrent Criterion-Related Validity Data

## 4. DISCUSSION

The EPS appears to be a valid instrument for the purpose of identifying individuals who have a history of anxiety, depression, mania, psychosis, or antisocial tendencies (with the strongest evidence for validity involving the first three types of dysfunction). In addition, the EPS is more efficient at differentiating ever-

diagnosed individuals from never-diagnosed individuals than several currently available commercial psychodiagnostic instruments, for the most part. Phase II research is currently underway using a later version of the EPS (including indicators of somatization and cognitive dysfunctions) in a predictive criterion-related validation study with actual military recruits.

The implication of the Phase I results, reported herein, is that the EPS may be suitable as a psychiatric screen for the military enlistment setting. The fact that the distribution curves of EPS scores for never- and ever-diagnosed individuals are relatively distinct (e.g., see Figure 1, upper left) suggests that individuals who attrit from the military for reasons of psychiatric disorder should form a relatively distinct group, in terms of EPS scores. This, in turn, should enable us to set cut-off scores that will allow us to efficiently distinguish likely-to-attrit individuals in the future; this is the focus of the Phase II research.

We are interested in discussing the use of the EPS in connection with military entry or operational environments. The first author may be contacted via e-mail sent to mark@professionalservicesgroup.net; in addition, surface mail may be directed to the addresses on the title page.

## PRESENTATION AND CITATION INFORMATION

Regrettably, this presentation was not included on the *Proceedings* CD-ROM of the 24th Army Science Conference, although it was officially accepted for presentation, and was presented as poster JP-12 at the Conference. An American Psychological Association-style citation of this paper would be as follows:

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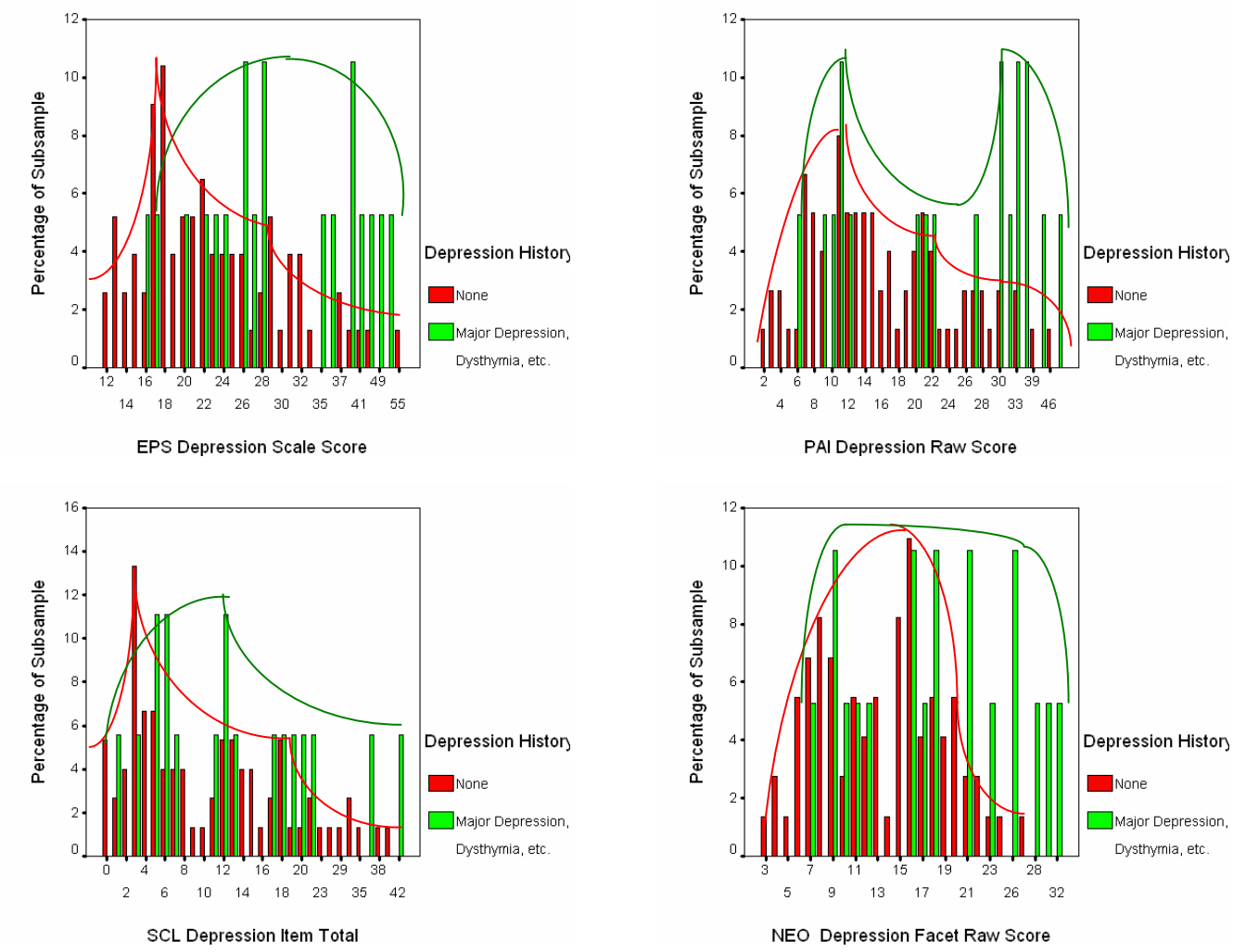


Figure 1: Depression Score Distributions of Four Scales
for Participants With and Without History of Depression

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