Pre-Post Inventory: Reliability and Validity Study

Donald D Davignon, Ph.D.

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Abstract

The validity of the Pre-Post Inventory (PPI) was investigated in a sample of 749 participants. There were 175 participants who completed both pretest and posttest. The PPI has seven scales for measuring risk of substance (alcohol and drugs) abuse, self-esteem, distress, stress coping problems and resistance attitudes. Pretest reliability analyses showed that all seven PPI scales had alpha reliability coefficients of between .83 and .91. The Alcohol and Drugs scales identified nearly all participants who admitted alcohol and drug problems (98.1% and 97.6%), respectively. Clients seriously distressed were identified by the Distress Scale (93.2%) and all (100%) of the clients who admitted resistance attitudes were identified by the Resistance Scale. PPI classification of risk was shown to be within 1.7% of predicted risk range percentile scores for all PPI scales. This study demonstrates that the PPI is reliable and valid.

Pre-Post Inventory: Reliability and Validity Study

The Pre-Post Inventory (PPI) is an automated computerized assessment instrument designed for clinical assessment at intake (pre-treatment) and post-treatment intervals. It enables comparison of client status prior to, during and upon treatment completion. The PPI can be re-administered to the same client at 30 day intervals or at important decision making points in the treatment program, e.g., intake, referral and continuation or completion of treatment. The PPI provides objective and accurate problem identification, aids in decision-making regarding the type of intervention needed, changes in inpatient-outpatient status, continuation or completion of treatment and it helps determine effectiveness of treatment. The PPI promotes provider accountability, utilization review and substantiation of decision making.

PPI comparison reports compare pretest results with posttest results. The comparison report is an objective and standardized procedure for evaluating client change, program effectiveness and outcome. The PPI is designed to measure the severity of problems in clinical settings. It is a risk and needs assessment instrument that has been shown to be correlated with experienced staff judgment and other recognized tests. PPI users usually identify client risk, substance (alcohol and other drugs) abuse and client need prior to recommending intervention, supervision levels and/or treatment.

The Pre-Post Inventory (PPI) is a multidimensional test that was developed to meet the needs of clinical practitioners screening and assessment. The PPI has seven scales that measure alcohol and drug abuse severity, self-esteem, distress, stress coping abilities and resistance attitudes. In addition, there is the Truthfulness Scale to measure client truthfulness, denial and problem minimization while completing the PPI. Truthfulness Scale scores are used for truth-correcting other scale scores.

This study validates the PPI in a sample of clients who were processed at a Midwestern state services program for youths. The data for this study was obtained from the agencies that used the PPI. The method for validating the PPI was to examine the accuracy at which the PPI identified problem drinkers, problem drug abusers, and clients who admitted having distress and resistance problems. In the PPI, problem information is obtained from the participants' responses to criterion items. Clients who admit problems would be expected to score in the corresponding scale's problem range. The following criterion items were used, "I have a drinking or alcohol-related problem." "I have a drug problem." "This last month I have often been very anxious and depressed." "I do not want staff advise about how to deal with my problems."

For predictive validity analyses, participants were separated into two groups, those who admitted problems and those who did not admit to problems. Then, participant scores on the relevant PPI scales were compared. It was predicted that clients who admitted to having a problem (problem group) would score in the problem risk range (70^{th} percentile and above) on the relevant PPI scales. Clients who did not admit to having a problem (non-problem group) would score in the low risk range (39^{th} percentile and below). Participants who had problems and also scored in the 70^{th} percentile range and above was considered a correct identification of problems. High percentages of participants with problems (admission of problems) and elevated problem risk scores would indicate the scales were valid.

Method

Subjects

There were 749 participants tested with the PPI at intake (pretest). Data for this study was provided by a Midwest state services program that used the PPI. Test data were collected during the year 2002. There were 668 males (89.2%) and 81 females (10.8%). Age of the participants for the most part ranged from 14 through 16 as follows: 12 & Under (1.3%); 13 (6.0%); 14 (14.0%); 15 (27.4%); 16 (41.5%) and 17 (9.7%). The demographic composition of the participants was as follows. Race/Ethnicity: Caucasian (70.6%); Black (24.0%), Hispanic (3.3%), Native American (0.5%) and Other (1.4%). Education: Seventh grade or less (21.2%); Eighth grade (41.3%); Ninth grade (41.3%); Tenth grade (4.6%); Eleventh grade (0.9%); High school graduate (0.1%). There were 175 of these participants who completed both the PPI pretest and posttest.

Procedure

Participants completed the PPI pretest as part of their intake evaluation for referral in state youth services programs. The PPI was administered to participants for the purpose of selecting appropriate levels of intervention and before treatment was initiated. PPI posttest questions are identical to the pretest questions. No prior history information is included in this test. That is, no criminal history is included in scale scoring procedures.

The PPI contains seven measures or scales. These scales are briefly described as follows. The Truthfulness Scale measures respondent's truthfulness, denial and problem minimization while taking the PPI. The Alcohol Scale measures severity of alcohol use or abuse. The Drugs Scale measures severity of drug use or abuse. The Distress Scale measures sorrow, misery, pain and suffering. Distress incorporates pain (physical and mental), physical and mental abuse, agony and anguish. The Resistance Scale measures cooperation and willingness to accept help from staff. The Self-Esteem Scale measures a client's explicit valuing and appraisal of self. The Stress Coping Abilities Scale establishes how well the client copes with stress. A score at the 90^{th} percentile or higher on this scale identifies established emotional and mental health problems.

Results and Discussion

The inter-item reliability (alpha) coefficients for the seven PPI scales are presented in Table 1. Reliability statistics are presented for both Pretest and Posttest data. All scales were highly reliable. All of the alpha reliability coefficients for all PPI scales at pretest were at or above 0.83. These results demonstrate that the PPI is a reliable test for counseling client assessment.

Pretest-posttest reliability coefficients demonstrate that the PPI maintains high test-retest reliability. The PPI can be re-administered because the Posttest reliability coefficients are just as high as Pretest reliability coefficients.

Slight reductions on some Posttest scales reliability coefficients indicate that clients changed, to a varying extent, their perception of "problem." They tend to redefine their interpretation of what constitutes a "problem." The interval between Pretest and Posttest administrations varied from 0 months to 23 months. For research purposes fixed retest intervals would be desirable but were not possible in this study.

Table 1. Reliability of the PPI
All coefficient alphas are significant at p<.001.

PRE-POST SCALES	Pretest Alphas	Posttest Alphas
Truthfulness Scale	**.86**	**.86**
Alcohol Scale	**.86**	**.84**
Drugs Scale	**.87**	**.84**
Distress Scale	**.85**	**.82**
Resistance Scale	**.83**	**.83**
Self-esteem Scale	**.91**	**.93**
Stress Coping Abilities	**.88**	**.90**

Predictive validity results are presented in Table 2. Table 2 shows the percentage of participants who admitted to problems and who scored in the problem risk range on the selected PPI scales in comparison to participants who scored in the low risk range. PPI validity and accuracy statistics are presented for Pretest data. This was done because Pretest scores set the baseline performance upon which to compare Posttest scores. Comparisons of PPI scale scores between Pretest and Posttest data are presented and discussed.

For the Alcohol and Drugs Scales problem behavior meant the participant admitted to having an alcohol or drug problem. For the Distress Scale, clients' responses indicated a severe distress problem, and for the Resistance Scale problem behavior meant a resistance or uncooperative attitude. Table 2 shows that Alcohol and Drugs Scales identified youths who admitted to drinking and drug problems. The PPI Alcohol Scale identified nearly all (98.1%) of the 162 youths who admitted having an alcohol problem These youths are classified as problem drinkers and 98.1 percent of them or 159 youths had Alcohol Scale scores at or above the 70th percentile. The Alcohol Scale correctly identified almost all of the juveniles categorized as problem drinkers.

The Drugs Scale identified nearly all 207 youths who admitted to a drug problem. 202 youths, or 97.6 percent, had Drugs Scale scores at or above the 70th percentile. These results validate the Drugs Scale.

Table 2. Predictive Validity of the PPI

PPI Scale	Correct Identification of Problems
Alcohol Scale	**98.1%**
Drugs Scale	**97.6%**
Distress Scale	**93.2%**
Resistance Scale	**100%**

The Distress Scale identified 136 of the 146 youths, or 93.2 percent, who admitted to having a severe distress problem. The Resistance Scale identified all 61 or 100 percent of the youths who admitted having a resistant attitude. These results validate the Distress and Resistance Scales.

For ease in interpreting participant risk, PPI scale scores were divided into four risk ranges: low risk (zero to 39th percentile), medium risk (40 to 69th percentile), problem risk (70 to 89th percentile), and severe problem risk (90 to 100th percentile). By definition the expected percentages

of participants scoring in each risk range (for each scale) is: low risk (39%), medium risk (30%), problem risk (20%), and severe problem risk (11%). Scores at or above the 70th percentile would identify participants as having problems.

The above predictive validity results lend support for using these particular percentages. The 70th percentile cut off for problem identification correctly classified nearly 100 percent of problem participants. The low risk level of 39 percent avoids putting a large percentage of participants into a "moderate" range. Putting low risk clients into intervention programs aimed at higher risk clients would over-burden counseling programs and may be counter-productive, unnecessarily alarm clients and result in clients exhibiting more problems than they originally had. This undesirable outcome of inappropriate level of intervention selection has been found in the corrections area (Andrews, D., Bonta, J. & Hoge, R. Classification for effective rehabilitation: Rediscovering Psychology. Criminal Justice and Behavior, 1990, 17, 19-52.).

Risk range percentile scores were derived by adding points for test items and truth-correction points, if applicable. These raw scores are converted to percentile scores by using cumulative percentage distributions. These results are presented in Table 3. Risk range percentile scores represent degree of severity. Analysis of the PPI risk range percentile scores involved comparing the participant's obtained risk range percentile scores to predicted risk range percentages as defined above. These percentages are shown in parentheses in the top row of Table 3. The actual percentage of participants falling in each of the four risk ranges, based on their risk range percentile scores, was compared to these predicted percentages. The differences between predicted and obtained are shown in parentheses.

As shown in Table 3, the objectively obtained percentages of participants falling in each risk range were very close to the expected percentages for each risk category. All of the obtained risk range percentages were within 1.7 percentage points of the expected percentages and many (21 of 28 possible) were within one percentage point. These results demonstrate that risk range percentile scores are accurate.

Table 3. Accuracy of PPI Risk Range Percentile Scores
Pretest Scale Risk Ranges (N = 749)

Pretest Scale	Low Risk (39% predicted)		Medium Risk (30% predicted)		Problem Risk (20% predicted)		Severe Problem (11% predicted)	
Truthfulness	37.8	**(1.2)**	29.9	**(0.1)**	21.7	**(1.7)**	10.5	**(0.5)**
Alcohol	40.6	**(1.6)**	28.7	**(1.3)**	19.6	**(0.4)**	11.1	**(0.1)**
Drugs	39.8	**(0.8)**	28.9	**(1.1)**	20.3	**(0.3)**	11.1	**(0.1)**
Distress	38.0	**(1.0)**	30.3	**(0.3)**	20.9	**(0.9)**	10.9	**(0.1)**
Resistance	37.8	**(1.2)**	29.4	**(0.6)**	21.2	**(1.2)**	11.6	**(0.6)**
Self-esteem	39.4	**(0.4)**	29.4	**(0.4)**	20.9	**(0.9)**	10.3	**(0.3)**
Stress Coping	39.0	**(0.0)**	29.8	**(0.2)**	20.1	**(0.1)**	11.1	**(0.1)**

There were 175 youths for whom both Pretest and Posttest data were available. Mean or average scale score for each PPI scale for these clients' is presented in Table 4. These results indicate that all scales were statistically significantly different. Posttest scale scores were, on average, significantly lower than Pretest scale scores for these clients.

All PPI scale comparisons demonstrate that Posttest scale scores are lower than Pretest scale scores. The juveniles showed improvement on all PPI treatment scales after having been in

treatment. However, the Pretest-Posttest intervals were not the same for all clients. It is likely that higher Pretest-Posttest intervals would result in higher or greater differences between Pretest and Posttest scores

The largest pre-post scale score differences occurred on the Self-esteem, Distress, Stress Coping Abilities and Drugs Scales. The Resistance and Alcohol Scales also demonstrated significant pre-post scale score differences. These treatment measures demonstrate that clients benefited from having been in treatment.

Table 4. Pretest-Posttest Scale Comparisons (N=175)

PPI Scales	Pretest Mean Score	Posttest Mean Score	T-value	Level of significance
Truthfulness Scale	23.85	21.29	t = 3.01	**p=.003**
Alcohol Scale	15.17	12.97	t = 2.77	**p=.006**
Drugs Scale	19.54	11.99	t = 8.13	**p<.001**
Distress Scale	17.53	11.75	t = 8.41	**p<.001**
Resistance Scale	10.35	8.25	t = 4.45	**p<.001**
Self-esteem Scale	20.52	30.41	t = 7.60	**p<.001**
Stress Coping Abilities	101.70	124.77	t = 7.11	**p<.001**

Note: Scores on the Self-esteem and Stress Coping Abilities Scales are reversed in that higher scores are associated with better self-esteem and stress coping abilities. There were 175 clients included in this analysis.

Conclusion

This study demonstrated that the PPI is a reliable and valid assessment test for counseling clients. Reliability results showed that all seven PPI scales were highly reliable. Reliability is necessary in screening tests for accurate measurement of client risk and need.

Predictive validity analyses demonstrated that the PPI identified participants who had substance abuse problems as well as emotional and resistance problems. The Alcohol and Drugs scales correctly identified nearly all participants who admitted having alcohol and drug problems. The Distress and Resistance scales were accurate in identifying distress problems and resistant attitudes, respectively. Furthermore, obtained risk range percentages on all PPI scales very closely approximated predicted percentages. These results support the validity of the PPI.

One of the most important decisions regarding a counseling client is what intervention program is appropriate for the client. The PPI can be used to tailor intervention (treatment) to each client, based upon his or her assessment results. Low scale scores are associated with low levels of intervention and treatment, whereas high scale scores relate to more intense intervention/treatment recommendations. Placing counseling clients in appropriate treatment can enhance the likelihood that a client will complete treatment, benefit from program participation and change their behavior.

The greatest benefit of intervention and treatment appears to be predominantly in youths' emotional adjustment. Fewer youth indicated emotional and mental health problems at posttest than at pretest. Intervention and treatment had a positive affect in lowering the number of juveniles who were suicidal or homicidal, and fewer youths had thoughts of death, dying or suicide at posttest.

Further benefits of intervention and treatment programs are seen in lower PPI scale scores on the Distress, Resistance, Self-esteem and Stress Coping Abilities Scales. Lower scale scores at posttest indicates that intervention and treatment positively affected youths' attitudinal, emotional and behavioral adjustment. PPI scale scores provide insight into outcome results.