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What is This?
MMPI-2 PREDICTORS OF ACADEMIC PERFORMANCE

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This report describes relationships between MMPI-2 validity and clinical scale scores and four different measures of academic performance (high school GPA, cumulative college GPA, classroom attendance, standardized course grade). A total of 435 MMPI-2 profiles were provided by college students enrolled in various undergraduate psychology courses. Elevations on the F, Pd, Sc, Ma, and Si scales were associated with academic performance difficulties. The number of elevated MMPI-2 scales was found to be significantly related to high school and college GPA. The profile mean elevation was also correlated significantly with high school and college GPA. Efforts were also made to quantify the severity of risk posed to academic performance by particular MMPI-2 attributes. Only about 7.5% of participants reported a cumulative college GPA that was less than or equal to 2.5, but this risk was tripled (22.6%) among participants with F scale elevations ($T > 59$). About 15.4% of the total sample attended class less than 60% of the time, while only about half (74%) of those generating low Pd scores showed equal levels of absenteeism. Simple MMPI-2 interpretive guidelines are provided for the identification of students at elevated risk for academic difficulty. The practical and theoretical implications of these results were discussed within the context of a broader literature involving the use of psychological inventories to identify cognitive and academic functioning deficits.

The second edition of the Minnesota Multiphasic Personality Inventory (MMPI-2) provides a broad self-report appraisal of psychiatric symptomatology, including mood, anxiety, somatoform, personality, and thought disturbance indicators (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989), and has been more widely administered than other major inventories such as the Millon Clinical Multiaxial Inventory-III (MCM-III; Millon, Millon, & Davis, 1994), Coolidge Axis II Inventory (CATI; Coolidge & Merwin, 1992), and Personality Assessment Inventory (PAI; Morey, 1991). It has been translated into about 125 languages (Lonner, 1990), and a recent literature review found well over 9,000 MMPI and MMPI-2 citations since the early 1940s. Table 1 describes some of the interpretive possibilities advanced (Butcher et al., 1989) to account for extreme scale elevations ($T > 76$).

The MMPI-2 validity and clinical scales have been found to possess sound psychometric properties. The scoring and interpretation manual (Butcher et al., 1989) establishes that the MMPI-2 dimensions are multifaceted, with average internal consistency coefficients for the ten clinical and three validity
Table 1

**MMPI-2 Test Manual Interpretive Possibilities for Extreme Scale Elevations (T > 76)**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Interpretive Possibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>L (Lie)</td>
<td>test resistance or naiveté</td>
</tr>
<tr>
<td>F (Infrequency)</td>
<td>uncooperative, faking bad, marginal reading ability</td>
</tr>
<tr>
<td>K (Correction)</td>
<td>shy, inhibited, lacking emotional involvement, reliance on denial, lack of insight</td>
</tr>
<tr>
<td>1 (Hs: Hypochondriasis)</td>
<td>schizoid, bizarre bodily or somatic delusions, constricted, immobilized by multiple symptoms and complaints</td>
</tr>
<tr>
<td>2 (D: Depression)</td>
<td>withdrawn, overwhelmed with problems, hopelessness, guilt-ridden, feelings of unwor thiness and inadequacy</td>
</tr>
<tr>
<td>3 (Hy: Conversion Hysteria)</td>
<td>highly suggestible, sudden anxiety and panic episodes, uninhibited, infantile tantrums, reacts to shame by developing physical symptoms</td>
</tr>
<tr>
<td>4 (Pd: Psychopathic Deviate)</td>
<td>poor judgment, unstable, irresponsible, selfcentered and immature, antisocial actions, aggressive or assaultive</td>
</tr>
<tr>
<td>5 (Mf: Masculinity-Femininity)</td>
<td>traditional opposite-gender interest patterns</td>
</tr>
<tr>
<td>6 (Pa: Paranoia)</td>
<td>thought disorder, mistaken beliefs, ideas of reference, vengeful and brooding, may act upon delusions</td>
</tr>
<tr>
<td>7 (Pt: Psychasthenia)</td>
<td>ruminating, rigid rituals, agitation, superstitious phobias, feelings of guilt, fearful, anxiety, depression</td>
</tr>
<tr>
<td>8 (Sc: Schizophrenia)</td>
<td>disordered thinking, eccentric behaviors, delusional, socially reclusive, poor contact with reality, hallucinatory</td>
</tr>
<tr>
<td>9 (Ma: Hypomania)</td>
<td>expansive and grandiose, irritable, poor temper control, hyperactive and distractible, impulsive decisions, confusion</td>
</tr>
<tr>
<td>0 (Si: Social Introversion)</td>
<td>withdrawn, aloof, insecure, indecisive, ruminative, retiring</td>
</tr>
</tbody>
</table>


scales of about .65 in the normative sample (n = 2,600). The scoring manual reports 1-week test-retest scale reliabilities that range from .81 and .77, which is consistent with the findings (r = .60 to .90) of an independent team that examined a college sample (Matz, Altepeter, & Perlman, 1992). Meta-analyses suggest that these clinical scales can account for 10% to 20% of the variance in the diagnosis of major mood, anxiety, and psychotic psychiatric conditions (Zalewski & Gottesman, 1991). MMPI-2 scores have been shown to be useful in predicting treatment utilization and outcome (Chervinsky, Ommaya, de Jonge, Spector, Schwab, & Salazar, 1998; Chisholm, Crowther, & Ben-Porath, 1997; Jin, Rourke, Patterson, Taylor, & Grant, 1998; Marshall & Roiger, 1996; Stewart, 1996). Graham (1988) has provided support for the validity of the clinical scales in predicting the symptom severity of 423 psychiatric patients and 1,644 normative control participants. The MMPI-2 has been used as a tool for selecting military personnel (Westefeld & Maples, 1998), and the MMPI depression scale has been shown to predict military failure (Parkkola, Tuominen, & Piha, 1997).
The MMPI and MMPI-2 have typically been administered to assist in the evaluation of the contemporary emotional status of clients seeking mental health treatment. The associations between MMPI-2 scale elevations and many psychological disorders, as defined by clinically significant distress or impairment in occupational, interpersonal, or cognitive functioning, has become accepted as a basis for the identification of high-risk individuals within mental health delivery systems. Scale elevations have also been interpreted to suggest difficulties in long-term adaptation to psychosocial stressors.

The interrelationships between emotional, behavioral, and cognitive or academic functioning in psychopathology have been particularly difficult to delineate. Interpretive guides for both editions (Graham, 1987; Butcher et al., 1989) anticipate that scale elevations portend a variety of problems in cognitive and information processing, including inflexibility in problem solving (L scale), distractible (F scale), inability to concentrate (D scale), indecisive (Pt scale), disturbed thinking (Sc scale), and impulsivity (Ma Scale). Pd elevation descriptions such as nonconformity, irresponsibility, rebelliousness, intolerance of tedium, and history of underachievement provide more direct predictions of academic difficulties than have been found using alternative MCMI-II (King, 1998) and CATI (King, 2000) measures of sociopathy.

Mean MMPI-2 validity and clinical scale scores do appear to be higher among learning-disabled college students (Ackerman, McGrew, & Dykman, 1987; Gregg et al., 1992) and neurologically impaired medical patients (Gass & Apple, 1997; Mittenberg, Tremont, & Rayls, 1996). Gass (1996) found D, Pt, and Sc scores on the MMPI-2 to be inversely related to the Attention Span, Logical Memory, and Visual Reproduction subtest scores of the Wechsler Memory Scale-Revised among patients with neuropsychiatric impairment. Greenway and Milne (1997) found significant relationships between the Familial Discord Harris-Lingoes Pd subscale of MMPI-2 and nine WAIS-R subtests (Information, Vocabulary, Arithmetic, Comprehension, Similarities, Picture Completion, Picture Arrangement, Block Design, and Digit Symbol) among women in the general population. Weaker relationships were found for men in this sample, alerting future researchers to attend closely to gender interactions when examining the effects of MMPI-2 elevations on cognitive performance.

Unfortunately, the limited data regarding specific MMPI-2 scale relationships with cognitive and academic performance are also sometimes contradictory. For example, Kodman (1984) found that MMPI Hy, Pd, Mf, Pt, Sc, and Si scales were actually higher among college students achieving Summa Cum Laude honors, and Johnson (1999) failed to find significant relationships between WAIS-R and MMPI-2 variables among a small sample of Vietnam veterans experiencing post-traumatic stress disorder.

The present study examines four academic performance variables (high school GPA, cumulative college GPA, classroom attendance, and standardized course grade) as important indices of adaptive functioning, particularly in the cognitive and behavioral realms. These results will contribute to a limited data base regarding the concurrent validity of the MMPI-2 scales as correlates with important indices of cognitive and academic functioning.
METHOD

Participants

Over 800 college students enrolled in undergraduate abnormal, personality, introductory, and clinical psychology classes at a major midwestern state university were screened as potential participants in the present study. The average participant had accumulated close to 3 years of college credit ($M = 72$, $SD = 34$), and they were all given extra credit (about 4% of their final grade) for their roughly 5 hours of participation.

Exclusion Criteria

MMPI-2 profiles were excluded for participants generating an F scale $T$ score in excess of 99 (Graham, 1987). The small number ($< 6\%$) of potential participants who identified themselves as ethnic (Native American, Hispanic, Asian, Mixed, or Other Race) were also excluded from analysis.

Independent Variables

Initial analyses were conducted to establish which MMPI-2 validity and clinical scales provided significant predictors of academic performance. Comparisons were then made between participants with elevated ($T > 59$), average ($T = 40-59$), and low ($T < 40$) levels of the MMPI-2 variable in question.

Dependent Measures

Academic performance measures included high school and college grade point averages, classroom attendance, and standardized course grade. Subjects were asked to provide an estimate of their high school and cumulative college grade point averages. A random subset of the total participant pool provided a second estimate at a later date (varied from 1 to 3 months) of their final high school and cumulative college GPA. Participants in the present sample were consistent in estimating their high school ($r = .93$) and college ($r = .97$) grade point averages. A review of university records found strong relations between reported and actual cumulative college GPA for random samples of 34 men, $r (32) = .94$, $p < .001$, and 51 women, $r (49) = .91$, $p < .001$. Classroom attendance was measured for the psychology course of enrollment using signed roll sheets that were distributed during each session. The validity of signed sheets as an indicator of classroom attendance was verified on multiple occasions over the 30-month data collection period, generating close to 100% accuracy on each occasion. Although some inaccuracy on roll signatures is certainly assumed, the enrollment of all participants in the researcher’s courses allowed fairly close monitoring of classroom attendance accuracy. Final course grades were
generated as standardized z scores using the final score mean and standard deviation for each course.

Procedure

Participants who signed consent forms were invited to complete a number of psychological inventories (including the MMPI-2) administered in random sequence and scheduled typically in multiple sessions at the convenience of the participant during the semester of course enrollment. All testing was completed in privacy, and each participant coded the completed protocol with a six-digit self-generated number (birth dates were suggested) to allow for anonymity but eventual matching in the final data file. Each class was monitored closely to ensure confidentiality and no redundancy in the use of anonymous code numbers. No participant was given test feedback, and study objectives were described in general terms.

RESULTS

Approximately 50% of students invited to participate completed informed consent forms, and about 92% of this group met the specified profile validity inclusion and racial criteria for a total of 435 participants (75% women). High school GPA differences were found between the men (M = 3.22, SD = .58) and women (M = 3.48, SD = .44). College GPA differences were also found between the men (M = 3.17, SD = .48) and women (M = 3.32, SD = .43). Class attendance (M = 78%, SD = 18%) did not differ significantly between men and women.

Gender Differences

Women participants were younger than the men, F (1, 431) = 5.23, p < .02, and generated higher high school, F (1,433) = 24.8, p < .001, and college, F (1,433) = 8.4, p < .01, grade point averages. Men earned more cumulative college credits, F (1,420) = 6.54, p < .01. Gender differences in class attendance were not found, F (1, 433) = 3.36, p = .07. Women were found to score signifi-

Table 2

<table>
<thead>
<tr>
<th>Scale</th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>L</td>
<td>48</td>
<td>9</td>
<td>49</td>
</tr>
<tr>
<td>F</td>
<td>51</td>
<td>12</td>
<td>50</td>
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<tr>
<td>K</td>
<td>53</td>
<td>9</td>
<td>54</td>
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<tr>
<td>Hs</td>
<td>51</td>
<td>10</td>
<td>52</td>
</tr>
<tr>
<td>D</td>
<td>48</td>
<td>9</td>
<td>49</td>
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<tr>
<td>Hs</td>
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<td>D</td>
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<td>Mf</td>
<td>49</td>
<td>12</td>
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<tr>
<td>Pa</td>
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<td>11</td>
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<td>Pt</td>
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<tr>
<td>Sc</td>
<td>53</td>
<td>12</td>
<td>51</td>
</tr>
<tr>
<td>Ma</td>
<td>52</td>
<td>10</td>
<td>51</td>
</tr>
<tr>
<td>Si</td>
<td>45</td>
<td>8</td>
<td>46</td>
</tr>
</tbody>
</table>

\( ^a n = 326, ^b n = 109. \)

\* p < .05. *** p < .001.
cantly higher on the Mf, F (1, 433) = 25.1, p < .001, and lower on the Sc scale, F (1, 433) = 4.54, p < .05 (see Table 2).

Table 3 shows the correlations between these same variables categorized by gender. Fisher’s z transformation (Ferguson, 1981) procedure was used to establish that correlation strengths did not differ significantly between men and women.

Table 3

| Variable Intercorrelations for Male\(^a\) and Female\(^b\) Samples |
|--------------------------|-------|-------|-------|-------|-------|-------|
| Variable               | 1     | 2     | 3     | 4     | 5     | 6     |
| 1. AGE                  | —     | —     | .34*** | .03  | .31*** | .00  | .12*  |
| 2. HS GPA               |     | —     | —     | .49*** | .03  | .38*** | .10  |
| 3. COLL GPA             | .02  | .25** | —     | —     | .11*  | .61*** | .22*** |
| 4. COLL Credits         | .22* | .11  | .15  | —     | —     | .02  | .05  |
| 5. Course Grade         | .04  | .25** | .55*** | .07  | —     | .21*** |
| 6. Attendance           | .19* | .03  | .31*** | .07  | .24** | —     |

Note.— Male sample correlations presented beneath the diagonal with women above. The fifth variable refers to cumulative college credits during the semester of participation.

\(n = 109\). \(n = 326\).

\(p < .05\). \(p < .01\). \(p < .001\).

**Academic Variable Correlates**

Simple Pearson product moment correlations were calculated for men and women between \(T\) scores for the 13 validity and clinical scales of MMPI-2 with the four measures of academic performance. An alpha of .01 was used to correct for the error rate associated with these 104 correlations, and the results of the five scales where significant relationships were found are presented in Table 4. Elevations on the F, Pd, Sc, and Ma scales were generally associated with academic performance difficulties, whereas higher Si introversion scores appeared to enhance classroom attendance. Gender differences in correlation strengths (as indicated by the Fisher’s z transformation procedure) were not observed in any of these cases. Figure 1 illustrates the MMPI-2 profile differences that were found between high (+ 1 SD) and low (- 1 SD) college achievers (significant group differences found for the L, F, Hs, Pd, Sc, and Ma scales).
Figure 1

MMPI-2 Profile Differences between High and Low College Achievers

Attendance Analyses

Relationships between classroom attendance and measures of psychopathology have not been extensively investigated. This variable reflects a behavioral tendency that may well generalize to other facets of psychosocial functioning. MMPI-2 variables were frequently linked to classroom attendance (see Table 4), and gender differences in these relationships were common. Attendance was significantly correlated with F, Pd, Sc, and Ma scores among women, but not men. The Si scale was a equally strong positive predictor of attendance for both men and women.

Profile Elevations

Additional analyses were conducted to determine if the number of T-score elevations (> 59) or the average T-score value would predict academic performance more successfully than particular elevations in isolation. The number of elevated MMPI-2 scales was found to be significantly related to high school, \( r(414) = -.16, p = .001 \), and college, \( r(414) = -.16, p = .001 \), GPA. Elevation number was not significantly correlated to class attendance, \( r(414) = -.03, p = .60 \). ANOVA results comparing participants with zero to four (or more) elevations resulted in significant differences in the prediction of high school, \( F(4, 405) = 2.91, p = .02 \), but not college, \( F(4, 405) = 1.92, p = .10 \), GPA. The primary finding was that participants with more than two MMPI-2 elevations reported significantly lower high school GPAs than did those with no elevations (\( \delta = .48 \)). The mean MMPI-2 scale score value also correlated significantly with high school GPA, \( r(414) = -.16, p = .001 \), and college performance, \( r(414) = -.13, p = .001 \). Stepwise regression analyses demonstrated that the combination of
multiple MMPI-2 scales would not account for appreciably more variance than particular dimensions utilized in isolation.

**Practical Significance**

Further efforts were made to quantify the severity of risk posed to academic performance by MMPI-2 attributes. For example, only about 7.5% of the participants in the present sample reported a cumulative college GPA that was less than or equal to 2.5, but this risk was tripled (22.6%) among participants with F scale elevations ($T > 59$). About 15.4% of the total sample attended class less than 60% (< 1 SD from total mean) of the time, while only about half (7.4%) of those generating low Pd scores showed equal levels of absenteeism.

**DISCUSSION**

Results from the present study are expected to generalize to Caucasian midwestern college students who are inclined to volunteer (about 50% of the present sample) for extra credit research. These factors could prove to be important restrictions to the extent that these MMPI-2 relationships generalize to broader college and clinical populations. Although high school and college GPAs were higher among the women, relationships between the MMPI-2 variables and academic performance seemed similar among men and women in this college sample.

The present results provide data of potential theoretical and practical importance. MMPI scale elevations have historically been associated with maladaptive functioning, and the present study examined whether or not these relationships extend to academic achievement in the college population. The MMPI-2 F, Pd, Sc, and Ma scales do seem to provide valid predictors of academic difficulties among college students. High ($T > 59$) and low ($T < 40$) Pd groups differed by .84 standard deviations in high school GPA, and participants with F elevations ($T > 59$) were .64 standard deviations lower in college GPA than their average counterparts. These findings were not surprising because extreme elevations on the F, Sc, and Ma scales of the MMPI-2 are thought to reflect proclivities toward distorted thinking, concentration difficulties, impulsivity, irritability, and confusion, which reflects some of the more serious psychopathology dimensions measured by the inventory (see Table 1). The Pd scale is designed to identify penchants toward nonconformity, irresponsibility, and immaturity that have been predictably linked to poor academic performance in other psychometric analyses (King, 1998, 2000). For the most part, higher MMPI-2 scale scores mitigated against favorable academic performance.

Class attendance in the course of enrollment provides a behavioral index of responsibility that may generalize broadly beyond its academic consequences. MMPI-2 Pd and Si scales were predictive of absenteeism. Only 20% of participants with Pd elevations ($T > 59$) attended class regularly (> 90%), and those with Pd elevations were twice as likely to exhibit high levels of absenteeism (> 40%).

Antisocial personality features have now been associated with academic performance difficulties and college class inattention for three major psychometric inventories. The MMPI-2 Pd scale appeared to provide a weaker pre-
dictor of high school and college GPA than either the MCMI-II (King, 1998) or CATI (King, 2000). The present study included an additional 120 participants over those examined in these previous MCMI-II and CATI analyses. Although statistically significant gender differences in correlation strength were not observed, there was a clear trend toward stronger relationships between these three academic performance variables and the Pd scale among men in the present MMPI-2 analysis. The sociopathy scales of major psychological test inventories such as the MMPI-2, MCMI-II, CATI, and PAI appear to provide robust predictors of academic underachievement that warrant continued attention. Perhaps the most discriminating items from multiple sociopathy scales could be merged into a superior brief screening measure for practical use by high school and college guidance counselors interested in detecting personality features (such as nonconformity, irresponsibility, resentment of authority, etc.) that predicted academic underachievement. Such as a scale would be of most value if it was able to detect subtle attitudinal and motivational features that were highly predictive ($r > .5$) of academic performance deficits not easily anticipated from direct behavioral observation (e.g., open rebelliousness and hostility).

The use of the MMPI-2, particularly the F, Pd, Sc, Ma, and Si scales, to identify attributes that appear to detract from academic performance was supported by the present results. These relationships were not unexpected given the impact of many forms of psychopathology on adaptive coping. MMPI-2 profiles, when available, may serve to alert guidance or other mental health counselors to attend more carefully to student behaviors that might compromise successful academic performance. In this regard, contemporary psychological test inventories can prompt more incisive analyses of the cognitive and academic aspects of global psychological functioning.

REFERENCES


