



PII S0887-6177(97)00043-7

MMPI/MMPI-2: Comparisons of Amnesic Patients

Kristie Bachna

Boston University School of Medicine and Harvard University School of Medicine

Mary Alice Sieggreen

Harvard University School of Medicine

Laird Cermak

Boston University School of Medicine

Walter Penk

Department of Veterans Affairs, Psychological Services

Margaret O'Connor

Boston University School of Medicine and Harvard University School of Medicine

The amnesic population provides a unique opportunity to examine the reliability of clinical tests because amnesics do not consciously recollect initial testing sessions. In this study, amnesic subjects were studied to examine the reliability between the Minnesota Multiphasic Personality Inventory (MMPI) and the MMPI-2. Findings indicated that there were no statistical differences between versions of the MMPI and further revealed that many of the scales were significantly correlated. Amnesic patients produced elevated scores on subscales two (depression) and eight (schizophrenia), not unlike various other groups of neurologically impaired individuals. This indicates that MMPI and MMPI-2 scores in these patient populations may reflect the medical and psychosocial effects of brain damage rather than premorbid personality dysfunction. A close evaluation of amnesics' performance, in conjunction with the critical items they endorsed, offers insight into the personality traits of the amnesic patient population. The relative stability of performance across personality tests administered over several weeks is relevant to the formation and stability of the amnesic's concept of self. © 1998 National Academy of Neuropsychology. Published by Elsevier Science Ltd

This report is funded in part by NINCDS program project grant NS 26985, funds from the Department of Veterans Affairs Medical Research Service, and by NIAAA grant AA-00187.

The authors wish to thank Suellen Walsh and Douglas Bitman for their assistance with an earlier draft of this paper. Address correspondence to: Kristie Bachna, Division of Behavioral Neurology, Beth Israel Hospital, 330 Brookline Avenue, Boston, MA 02215. E-mail: kbachna@bidmc.harvard.edu

INTRODUCTION

Conscious recollection of prior exposure to an event is a confounding factor in studies of test-retest reliability. Because previous responses may bias subjects' response patterns during a second testing session, memory could serve to increase the correlation between scores obtained through repeat administrations or by way of alternative versions of the same paradigm. The amnesic population presents a unique opportunity to examine the issue of test-retest reliability by controlling for the effects of memory. We previously described a profoundly amnesic patient's test-retest performance on the Rorschach test (O'Connor, Cermak, & Seidman, 1995). Results indicated nearly identical Rorschach profiles across two sessions separated by a 2-week interval of time suggesting that the Rorschach was a reliable instrument for measuring psychological processes. We have now extended this line of research to another personality measure, the Minnesota Multiphasic Personality Inventory (MMPI), and its revision, the MMPI-2.

Several research groups have examined the test-retest reliability of the MMPI, as compared with the MMPI-2, using both normal and psychiatric subjects (Ben-Porath & Butcher, 1989; Blake, Penk, Mori, Kleespies, Walsh, & Keane, 1992; Litz et al., 1991; McCarthy et al., 1990; Walsh, 1992). While they uniformly report that the MMPI assesses personality in a manner concordant to that of the MMPI-2, these studies did not control for the influence of memory for the first exposure to the test. Hence, it is difficult to know whether the role of memory increased the correlation between the MMPI/MMPI-2. Use of an amnesic population will control for the effects of memory, thus yielding a more reliable index of test-retest reliability.

In addition to examining test-retest reliability, the current study will address qualitative features of amnesics' MMPI/MMPI-2 performance. To date, there is little information regarding the psychological ramifications of chronic amnesia. Because organic amnesia and emotional dysfunction are both associated with damage to the limbic system it is possible that amnesia may alter the individual's psychological profile. The psychosocial consequences of amnesia could further contribute to changes in personality, which might be reflected by the MMPI/MMPI-2. The content of amnesics' MMPI/MMPI-2 responses will be examined to determine whether the MMPI/MMPI-2 captures fundamental personality characteristics of amnesic patients with regard to profile configuration as well as consistency of clinical/psychological presentation over time.

METHODS

Subjects

Ten patients (4 females, 6 males) were selected to participate in the study (Table 1). The subject pool had a mean age of 55.8 years ($SD = 16.2$). The average time since onset of amnesia was 12.6 years ($SD = 5.6$). Subjects had a mean IQ of 116.9 ($SD = 15.5$) and a mean of 15.2 years of education ($SD = 2.5$). All patients presented with circumscribed amnesic deficits within the context of otherwise normal intelligence. Each patient demonstrated a dense anterograde amnesia so that she/he was unable to learn and retain new information. The severity of the memory deficit contrasted markedly with normal performance on all other measures of neuropsychological functions, including tests of attention, vocabulary, reading, verbal analytic skills, deductive reasoning, mathematical abilities, perception, and capacity for abstract thinking. None of the amnesic patients met the American Psychological Association's criteria, as indicated in the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM-IV; American Psychiatric Association, 1994), for either Axis I or Axis

TABLE 1
Demographic Information

Name	Sex	Age	Years of Education	IQ	GM	Onset	Etiology
JT	M	42	14	127	110 ^a	1985	PLE
MB	F	68	16	123	87	1989	AcoA
PD	M	53	20	98	76	1981	Anoxia
SS	M	62	18	136	94	1971	HSE
PS	F	32	14	100	78	1981	Anoxia
GP	M	69	12	115	85	1981	KS
WV	M	78	12	110	70	NA	KS
EB	F	70	16	131	83	1983	Unknown
MR	F	51	14	134	86	NA	Unknown
DS	M	33	16	95	65	1988	Anoxia

Note. IQ = intelligence quotient; GM = general memory; M = male; PLE = paraneoplastic limbic encephalitis; F = female; AcoA = anterior communicating artery aneurysm; HSE = herpes simplex encephalitis; KS = Korsakoff's syndrome.

^aThis patient has been shown to be densely amnesic on most testing sessions due to bilateral temporal lobe seizures; however, he does occasionally perform normally on tests of memory, as he did in this instance.

II psychiatric disorders as determined by previous history and interview data. Etiological factors leading to amnesia included anoxia, herpes simplex encephalitis (HSE), Korsakoff's syndrome (KS), paraneoplastic limbic encephalitis (PLE), and rupture and surgical repair of anterior communicating artery (AcoA) aneurysms. Etiology of amnesia was unknown in two cases, even though the patients had been thoroughly examined by behavioral neurologists and neuropsychologists.

Materials

Each amnesic subject was given the MMPI and the MMPI-2. The original MMPI was published in 1943. Since that time there has been criticism of some aspects of the test, which resulted in the MMPI-2. Among other things, some of the language and references used in the MMPI were deemed obsolete and the original version contained some items that were irrelevant to personality assessment (Graham, 1990). The revised version of the MMPI, the MMPI-2, was created in 1989. The MMPI-2 is in most ways very similar to the MMPI, but the MMPI-2 includes a more contemporary and representative standardization sample, updated and improved items, deletion of objectionable items, and some new scales. Most supplementary scales from the MMPI can be scored on the MMPI-2.

Procedure

Group forms of the MMPI-1/MMPI-2 were administered in counterbalanced order to all 10 patients on two occasions. The average length of time between test administrations was 20 days ($SD = 6.9$). None of the patients recalled previous exposure to either form of the MMPI on the second test occasion. *T*-scores were obtained by transposing raw scores (from both the MMPI and MMPI-2) onto the original MMPI template.

RESULTS

Paired *T*-tests were calculated to compare amnesics' performance on the validity and clinical scales of the MMPI/MMPI-2 (Table 2). There were no significant differences between

TABLE 2
Paired *t*-Test Between Subscale Scores Across Minnesota Multiphasic Personality Inventory (MMPI) and MMPI-2

Scales	MMPI	<i>M</i>	<i>SD</i>	<i>t</i> -Value	<i>p</i> Value
L	1	56.5	10.0	1.5	.18
	2	53.3	11.3		
F	1	58.8	10.7	.1	.93
	2	59.1	12.5		
K	1	55.8	8.5	.4	.69
	2	56.4	7.1		
HS	1	57.6	13.3	.6	.55
	2	56.4	5.7		
D	1	77.7	16.7	.8	.44
	2	74.6	14.0		
HY	1	64.5	11.9	.1	.90
	2	64.2	9.9		
PD	1	60.0	10.0	.2	.85
	2	60.8	13.2		
MF	1	50.9	12.6	.1	.92
	2	51.2	10.2		
PA	1	62.5	14.4	.2	.84
	2	61.8	16.4		
PT	1	67.8	12.9	.1	.65
	2	67.4	14.0		
SC	1	70.2	18.4	.5	.62
	2	67.8	19.5		
MA	1	56.6	10.9	.7	.51
	2	54.3	14.0		
SI	1	56.9	10.2	.2	.83
	2	56.4	8.4		

Note. *M* = mean; *SD* = standard deviation.

any of the validity or clinical scales suggesting that amnesics performed equivalently on both versions of the test. The remarkable consistency between amnesics' respective MMPI/MMPI-2 profiles is illustrated in Figure 1. In order to obtain a better description of the sample, Table 3 outlines the percentage of subjects with *T*-scores greater than 65 for each subscale. As is evident, when collapsing and averaging across each subscale from the MMPI and MMPI-2 test conditions, more than 50% of subjects showed elevation on scales two and eight, depression and schizophrenia, respectively. Test-retest correlations between *t*-scores from the subscales of the MMPI/MMPI-2 underscored the consistency between the two tests: highly significant (.001) test-retest correlations were found for scales L and K and moderately significant (.01) correlations were found for scales Pa, Hy, and Si. Finally, significant (.05) correlations were found for scales D, Pt, Sc, Mf, and Ma; correlations for scale F approached significance (Table 4). In contrast, variability on scales Hs and Pd were noted across versions of the MMPI/MMPI-2.

Analysis of individual patient profiles revealed 50% concordance between two-point codes across the MMPI/MMPI-2. None of the amnesic patients displayed completely different two-point codes across tests. Only one patient, MB, showed a significant difference between the MMPI/MMPI-2. Although the configuration of clinical scales was the same across test sessions, her overall *T*-score profile declined during the second session. Interestingly, this patient had the shortest duration of amnesia at the time of testing. It is likely that the discrepancy between her MMPI/MMPI-2 profiles reflected a decrease in her emotional turbulence as she adapted to amnesia.

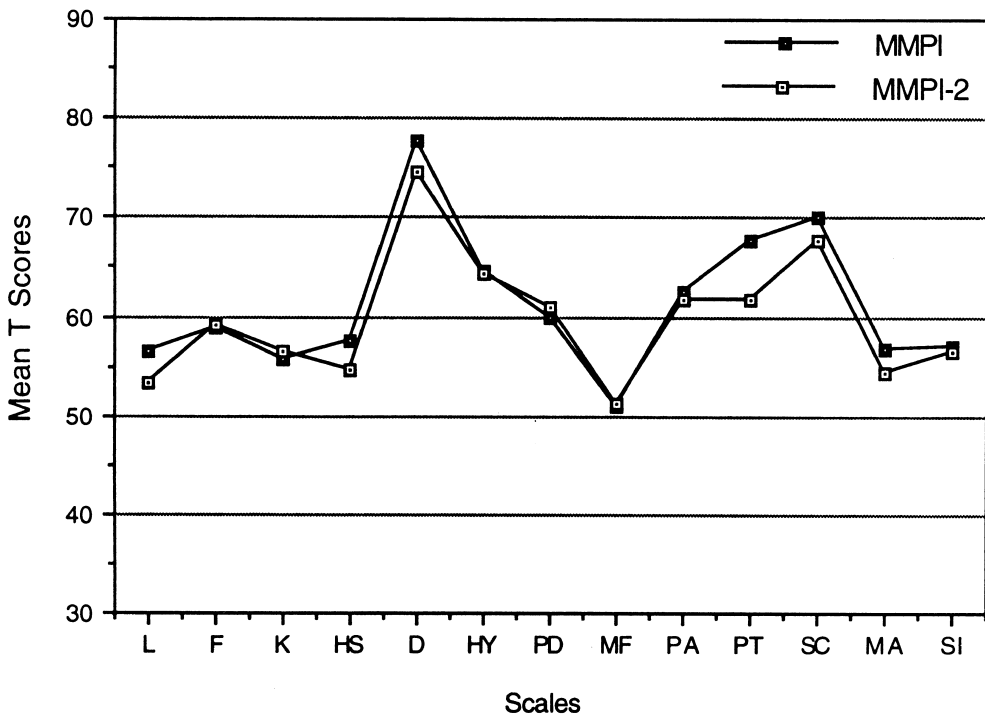


FIGURE 1. Mean amnesic profile for the Minnesota Multiphasic Personality Inventory (MMPI) and the MMPI-2.

DISCUSSION

The present data are in agreement with findings from MMPI/MMPI-2 reliability studies with normal control and psychiatric subjects affirming that the MMPI-2 assesses personality in a manner concordant with that of the MMPI (Ben-Porath & Butcher, 1989; Blake et al., 1992; Litz et al., 1991; McCarthy et al., 1990; Walsh, 1992). The current results are especially credible due to the fact that amnesic patients did not explicitly recall the initial MMPI session. Accordingly, conscious memory for prior responses could not have affected their responses during the second test session.

In addition to quantitative aspects of performance, qualitative features of amnesics' MMPI/MMPI-2 profiles were examined. In our study amnesics exhibited significant elevations on scales two (depression) and eight (schizophrenia). Under normal circumstances elevations on these scales are seen as indices of long-standing personality dysfunction with tendencies toward depression, confusion, social alienation, suspiciousness, and dependency. Those with elevations on these scales are often described as withdrawn, plagued by self-doubt, and lacking in self-confidence.

Close scrutiny of critical items from these scales revealed that many questions endorsed by amnesics were related to medical issues and the psychosocial effects of chronic amnesia. For example a majority of the 10 amnesics studied answered "true" to the following statement: "There is something wrong with my mind" (Table 5). This is, for the amnesic population, a realistic portrayal of their medical condition. Other MMPI studies with neurological patients have reported elevations on the same scales. In fact, many of the critical items en-

TABLE 3
Percentage of Subjects with T-Scores Greater Than 65 on Each Subscale

Scales	MMPI	Percent of Subjects with Scores > 65
L	1	25
	2	20
F	1	30
	2	20
K	1	10
	2	20
HS	1	20
	2	10
D	1	80
	2	70
HY	1	20
	2	20
PD	1	20
	2	20
MF	1	10
	2	10
PA	1	30
	2	20
PT	1	40
	2	60
SC	1	50
	2	30
MA	1	10
	2	30
SI	1	10
	2	20

Note. MMPI = Minnesota Multiphasic Personality Inventory.

TABLE 4
Test-Retest Correlations Between Subscales of Minnesota Multiphasic Personality Inventory (MMPI) and MMPI-2

Scale	Correlation	<i>p</i> -Value
L	.89	.001
F	.57	.086
K	.84	.001
HS	.18	.627
D	.70	.023
HY	.80	.004
PD	.42	.243
MF	.67	.031
PA	.76	.008
PT	.67	.031
SC	.70	.023
MA	.67	.033
SI	.73	.014

TABLE 5
Critical Items

Items endorsed by five or more amnesic patients

- I am easily awakened by noise. (T)
- There is something wrong with my mind. (T)
- My memory seems to be all right. (F)
- I certainly feel useless at times. (T)
- I am afraid of losing my mind. (T)
- I have had periods of time in which I carried on activities without knowing later what I had been doing. (T)
- I am about as able to work as I ever was. (F)

Items endorsed by at least four amnesic patients

- I am certainly lacking self-confidence. (T)
 - I have had very peculiar and strange experiences. (T)
 - I am sure I am being talked about. (T)
 - I have often had to take orders from someone who did not know as much as I did. (T)
 - I have had blank spells in which my activities were interrupted and I did not know what was going on around me. (T)
 - I have difficulty in starting to do things. (T)
-

dorsed by the amnesic subjects were identical to those endorsed by other neurologically impaired groups (Alfano, Neilson, Paniak, & Finlayson, 1992; Dikmen, Hermann, Wilensky, & Rainwater, 1983; Gass, 1991). For these reasons, we caution that elevations on the MMPI/MMPI-2 subscales should not necessarily be viewed as indices of premorbid personality dysfunction. Nonetheless, amnesics' MMPI/MMPI-2 profiles may still be psychologically meaningful in that these patients are prone to depression and social alienation.

The current data also raise interesting questions regarding the consistency of amnesics' self-perceptions over time. To date, minimal information is available regarding the effects of experience on amnesics' self-perceptions and psychological states. It has not been established whether the amnesic individual depends more on immediate memory or long-term memory in deriving a sense of self. If amnesic individuals depend on immediate memory to a disproportionate extent, changes in daily events could be expected to induce considerable mood fluctuations as well as changes in the concepts of self. Alternatively, amnesics' self-perceptions may be based upon and constrained by remote experiences predating the onset of amnesia. In this case, amnesics' self-perceptions would be remarkably consistent over time. The current study does not address the full complexity of this issue; however, these data and the previously mentioned study involving the Rorschach test (O'Connor et al., 1995) suggest that amnesia is accompanied by relative psychological stability and perhaps by emotional stasis. Clearly, personality tests other than the MMPI/MMPI-2 and Rorschach would provide interesting information germane to this issue.

SUMMARY

In summary, the current study suggests that the MMPI/MMPI-2 are highly correlated even when the potentially confounding effects of memory are controlled. These data indicate that responses obtained from the MMPI-2 can be compared to those from the MMPI. In addition, we described a personality profile for our amnesic population, one that included elevations on MMPI/MMPI-2 clinical scales two and eight. Based on our data, we cannot definitively determine the specific roles of premorbid personality, psychological reaction to brain damage, and selective damage to the brain systems involved in the regulation of emotion on MMPI performance. However, it is unlikely that these elevations reflect premorbid personality characteristics of our amnesic group because these patients came from diverse backgrounds and

none had prior histories of psychopathology or personality disorder. We are inclined to believe that the MMPI/MMPI-2 profile of this group emerged as a result of damage to limbic structures involved in emotional regulation and the medical and psychosocial consequences of chronic neurological disease. To this end, other studies with neurologically impaired patients have also demonstrated elevations on scales two and eight. It should be noted that our selection of densely amnesic subjects with high IQs may limit the generalizability of our findings.

Finally, we raised questions as to whether amnesics individuals demonstrate personality fluctuations over time or whether, instead, chronic amnesia results in psychological and emotional stasis. Our findings lead us to believe that the latter is more probable. Although the power of this finding is somewhat attenuated due to our small sample size, our data raise compelling questions regarding the stability of personality traits in amnesics and the applicability of personality tests to this population. Further research in this area is warranted and encouraged.

REFERENCES

- Alfano, D. P., Neilson, P. M., Paniak, C. E., & Finlayson, A. J. (1992). The MMPI and closed head injury. *The Clinical Neuropsychologist*, *6*, 134–142.
- Ben-Porath, J. J., & Butcher, J. N. (1989). The comparability of the MMPI and MMPI-2 scales and profiles. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, *1*, 345–347.
- Blake, D. D., Penk, W. E., Mori, D. L., Kleespies, P. M., Walsh, S. S., & Keane, T. M. (1992). Validity and clinical scale comparisons between the MMPI-1 and the MMPI-1-2 with psychiatric inpatients. *Psychological Report*, *70*, 325–332.
- Dikmen, S., Hermann, B., Wilensky, A., & Rainwater, G. (1983). Validity of the Minnesota Multiphasic Personality Inventory (MMPI) to psychopathology in patients with epilepsy. *The Journal of Nervous and Mental Disease*, *171*, 114–122.
- Gass, C. S. (1991). MMPI-1-2 interpretation and close head injury: a correction factor. *Psychological Assessment*, *3*, 27–31.
- Graham, J. R. (1990). *MMPI-2 Assessing Personality and Psychopathology*. New York: Oxford University Press.
- Litz, B., Penk, W., Walsh, S., Hyer, L., Blake, D. D., Marx, B., Keane, T. M., & Bitman, D. (1991). Similarities and differences between the MMPI-1 and MMPI-1-2 applications to the assessment of post-traumatic stress disorder. *Journal of Personality Assessment*, *57*, 238–253.
- McCarthy, S., Walsh, S., Penk, W., Keane, T., Wolf, J., & Monaco, V. (1990). *MMPI and MMPI-2 comparability among normal adults*. Boston, MA: American Psychological Association.
- O'Connor, M., Cermak, L., & Seidman, L. (1995). Social and emotional characteristics of a profoundly amnesic post-encephalitic patient. In R. Campbell & M. Conway (Eds.), *Broken memories* (pp. 45–53). Oxford: Blackwell Publishers.
- Walsh, K. (1992). Some gnomes worth knowing. *The Clinical Neuropsychologist*, *6*, 119–133.