
CLINICAL NOTES ON THE MMPI

NUMBER THREE IN THE SERIES

Use of the MMPI in the Assessment of Chronic Pain

Wilbert E. Fordyce, Ph.D.
University of Washington
School of Medicine

Edited by

James Butcher Ph.D.
Grant Dahlstrom Ph.D.
Malcolm Gynther Ph.D.
and
William Schofield Ph.D.

Introduction

Most of the so-called emotional, personality, or motivational problems associated with chronic pain patients can better be understood as examples either of direct reward for pain behaviors or of avoidance learning. In the former case medications, rest, or attention – the most common examples – have come to be a consequence of the patient's pain behavior. In the latter case, pain behaviors are rewarding because they yield time out (i.e., avoidance) from what is for the patient aversive events. The probability that avoidance behavior based on pain problems persisting is further enhanced when wage replacement compensation benefits accrue which have the effect of reducing the response cost of pain behaviors.

The data for the physician confronted with a problem of chronic pain consist mainly of the medical history setting forth the circumstances under which the problem arose, the documentation of structural damage (if any), *current* physical findings, and the pain behaviors observed. There has long been a strong tendency to attribute the current pain behaviors to the originating trauma and associated body damage, or to the ravages of treatment, as in scar tissue from surgeries. But that is an inference, not a statement of facts. It is entirely plausible, however compelling the information documenting body damage at time of onset, that the pain behaviors are persisting for other reasons.

Wiltse and Rocchio, (1975), for example, showed that physical findings had little relation to outcome in a surgical surrogate therapy for chronic back pain, chemopapain injections, whereas the MMPI did relate to outcome. Johnson (1978) has shown that among a large sample of industrially injured low back pain patients, if one *included* those for whom well documented disc disease was demonstrated, 78.3% had no physical findings while 100% were emitting persisting pain behaviors. When the disc disease patients were excluded, 93.1% had no physical findings.

The point for the moment is that physical findings serve as valid criteria by which to account for pain behaviors mainly during the early days and weeks in the history of the pain problem. As time passes and pain behaviors persist, the relationship between physical findings and pain behaviors often diminishes to the point of obscurity.* It is this issue which underlies the principal relevance of the MMPI in relation to clinical pain. The central role of devices such as the MMPI is to seek to shed light on why pain behaviors are persisting in the individuals to be evaluated. Since, in chronic pain, physical findings by themselves are often unsure bases for explaining persisting pain behaviors, to what extent can other potential explanations be derived?

Wilbert E. Fordyce, Ph.D.
University of Washington
School of Medicine

Special Characteristics of the MMPI in Relation to Chronicity

People having chronic disabling conditions (e.g. spinal cord injury, rheumatoid arthritis) have long been observed to show elevated scores on scales 1 and 3, if tested several months after onset. It is not uncommon for the very recently injured paraplegic or quadriplegic *not* to show elevations on 1 and 3, but if re-tested a few months hence, then to show the 1 and 3 elevations. It is of course patently absurd to think at time of onset that the spinal cord injured patient is not manifestly suffering a host of somatic difficulties. But what seems often to happen is that the person, at time of first testing, is continuing to describe him/herself as was true a few short days or weeks before.

One can re-state the preceding point by noting that scales 1 and 3 appear to reflect the probability the person will emit somatic concern of "physical sickness" or somatic distress, or pain behaviors. The elevations have little in themselves to say about *why* those sickness behaviors are emitted. They may occur because of the patient's physical condition, or for other reasons.

Special Issues Common to Pain

Chronic pain patients have been noted often to be depressed (Sternbach, 1974; Fordyce, 1976). This is particularly true where the problem has persisted for a long time and there is associated extensive interference in the person's way of life. In addition, elderly persons often seem to blur the distinction between pain and depression. One result is that some of them may come complaining of pain when the central problem is depression mislabelled as pain. MMPI assessment of the chronic pain patient must weigh the depression factor carefully.

*Terms such as psychogenic, conversion reaction, or hysterical are often used (sometimes even malingering) when there is a pain behavior-physical finding discrepancy. It takes us too far afield to explore thoroughly the problems those usages produce. The central objection is that the sole alternative to pain behaviors controlled by nociception is not some kind of intra-psychic or motivational problem. As has been described, pain behaviors are subject to influence by a spectrum of factors, only some of which can rigorously be conceived as personality problems.

Many chronic pain patients have become addicted and toxic from the protracted prescription of narcotic and other analgesics or muscle relaxants. When that has occurred, they may display behavior patterns suggestive of brain damage. Those patterns may show up on MMPI profiles. Therefore, indications of brain damage from an MMPI profile may have special relevance to chronic pain.

It is clinically observed also that many elderly patients coming with complaints of pain are found to have cortical deficits (Fordyce, 1978). It appears that the person finds the complaint of pain a less socially aversive explanation for constraints on the ability to perform than to acknowledge, for example, a memory deficit. Here, too, indications from an MMPI profile of possible cortical deficit have special relevance in the evaluation of chronic pain.

Pain and muscle tension are often related. This is particularly true of tension headaches and high back, neck, and shoulder pain such as is often found, for example, in post-whiplash accidents. Indications from the MMPI of tension states is also of special relevance (see pp. 14-15).

Many chronic pain patients are involved in compensation/litigation issues. They may be receiving wage replacement funding from a compensation program and they may be faced with periodically having to reauthenticate their pain problems. When this occurs in someone who finds time out from work or responsibility demands or the opportunity to manipulate the environment to meet his/her own needs, we have yet another factor to consider in relation to the MMPI. Indicators of readiness to manipulate others is something to examine for. This manipulative component is often operative in marital situations in which one member of the pair seeks to exert control or influence over the other via pain behaviors.

Finally, there is another kind of pain problem which is not yet well documented but which, clinically, has been observed with sufficient frequency to warrant mention. There are some chronic pain patients whose pain behaviors appear to reflect one trial learning associated with the originating trauma. The problem seems analogous to "traumatic neurosis," though the precise mechanism by which this approximately one trial learning occurs in some and not in others and why effects persist in some and not in others is not yet clear. At any rate, indications of phobic behavior from the MMPI should be considered as having some potential rele-

vance. It should be added, however, that identification of this kind of pain problem (perhaps appropriately termed a pain phobia) better derives from exploration of the stimulus conditions having specific potency in eliciting pain behaviors and not from an MMPI.

MMPI Evaluation of Chronic Pain

The preceding introductory comments have the intent of identifying the major parameters and concepts of chronic pain having relevance to the MMPI. But it should be recognized that the proper evaluation of problems of chronic pain should include four components, only one of which is the MMPI: (1) medical workup; (2) behavioral analysis interviews; (3) activity diaries; (4) MMPI.

There should be a good medical workup; one which is mindful of the hazards of inferring that body damage at time of onset necessarily continues to account for persisting pain behaviors. Unless exploration for currently active physical findings is conclusive, there should be a behavioral analysis, via interview of patient and spouse, of the prevailing contingencies to pain and well behaviors.

Behavioral analysis interviews are used to analyze the consequences which follow pain behaviors or their alternative: activity and well behavior. Detailed description of an interview format for this procedure can be found in Fordyce (1976). The general objective of such interviews is to determine whether pain behaviors appear to be followed by directly reinforcing consequences (paraphrased as, "When I 'hurt,' good things happen which otherwise would not.") or indirectly reinforcing consequences (paraphrased as, "When I 'hurt,' bad things don't happen which otherwise would.") The latter represents avoidance learning. Among the more common direct reinforcers of pain behaviors are prescription of pain medications on a *prn* ("take only as needed") or pain contingent basis, and special attention from physicians or family contingent on existence of a pain or illness problem. Indirect reinforcement for pain behaviors usually relates to difficulties the patient has in coping with life demands. Pain behaviors may lead to sanctioned constraints in activity, by which the individual gains "time out" from responsibilities, demands, or situations which, were he/she free to function, might prove aversive or threatening.

The MMPI is not an adequate substitute for behavioral analysis interviews. The user of the MMPI in the context of chronic pain should be alert to recognize that some physicians will request MMPIs under the mistaken belief that MMPI item responses correspond to a behavioral analysis. They do not.

Finally, in addition to the MMPI, it is often very useful to obtain from patients indications as to their current activity patterns and levels. This objective can usually be adequately served by asking patients to record for a few days on diary forms when they are sitting, standing/walking, and reclining. There are many important discriminations which can be made with the help of activity diaries. It is beyond the scope of this paper to deal with them in detail. To illustrate, patients recording consistently spaced medication ingestion, particularly through the nights, are usually addicted. Patients recording high levels of pain and much activity constraint through the day but then showing uninterrupted sleep are usually diagnostically quite different from those showing similar daytime patterns and frequent, irregular night-time disturbance. The former are more likely to have pain behaviors controlled by non-organic factors; the latter by organic factors.

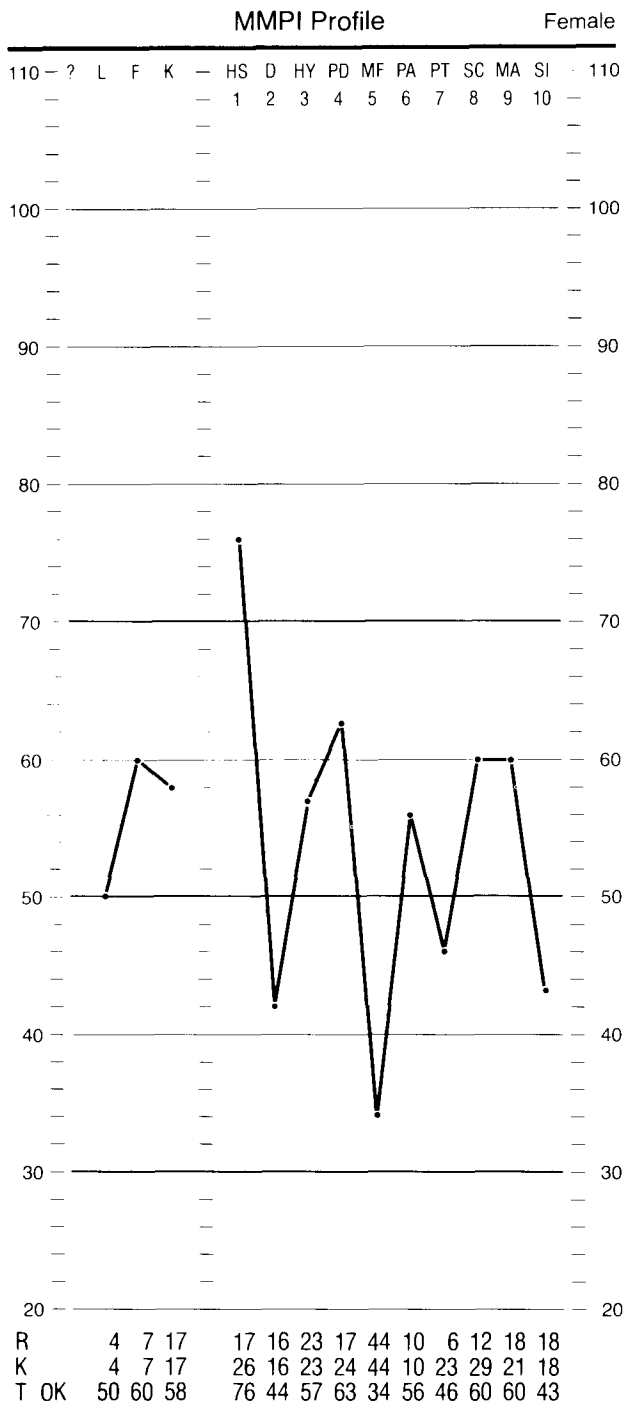
Nothing has been said about patient ratings of their pain. Such ratings, a form of social communication, often appear to have little relationship to any other pain relevant parameter, including physical findings and restricted activity level or functional impairment.

With all of the foregoing we can now proceed to a review of the use of the MMPI as an evaluation tool in regard to clinical pain. The format used will be to list frequent referral questions and then briefly describe MMPI profile characteristics bearing on those.

The first and generic referral question usually is, "Why are pain behaviors occurring when physical findings are minimal or lacking?" or, rephrased, "Does the MMPI indicate that psychological factors may account substantially or in any part for such behaviors?" That generic question can be broken down into specific issues.

1. Does the patient indicate considerable readiness to emit pain behaviors? What to look for:
 - (a) Elevations on scales 1 and 3. "Elevations" here means either primed (i.e., T=70 or higher) or coded 1-3 or 3-1. Where subtle/obvious sub-scores are used (a practice

Figure 1



the author recommends), 3-obvious should be fairly high; e.g., over 65. That is particularly true when the profile is coded 3-1.

Figure 1 illustrates the profile of a 57-year-old woman with many neck and back pain complaints but for whom workup made evident her "pain" was a set of actions designed to extricate her from stress. The profile shows readiness to emit pain behavior but very little emotional distress.

Figure 2 contrasts with Figure 1 by illustrating reluctance to emit pain behaviors. This young woman had very circumscribed abdominal pain elicited by a narrow set of activities and relating to guilt, anger, and resentment stemming from an abortion she didn't really want. Full workup suggested a phobic-like problem, as discussed under point 6, below.

To reemphasize previous statements, elevations on 1 and 3 say nothing important about whether pain behaviors relate to physical findings; only that the person is not reluctant to communicate body distress. There is an important corollary to that. If 1 and 3, particularly 1, are low (e.g., $T < 60$) the person indicates little readiness to signal pain. Such a person has diminished probability of "using" pain behaviors as a way of influencing the environment or of pursuing reinforcing social contingencies for pain behavior. In short, high 1-3 may or may not mean pain behaviors are occurring for non-organic reasons. If one uses 1-3 elevations as the criterion of non-organic pain, there will be many false positives, particularly among chronic pain patients. But in the absence of 1-3 elevations, most particularly where 1 is below 55, rejecting the hypothesis the pain problem relates primarily to non-organic factors likely will yield few false negatives.

2. Assuming that scales 1 and 3 have $T > 60$, what is the response cost of emitting many pain behaviors?

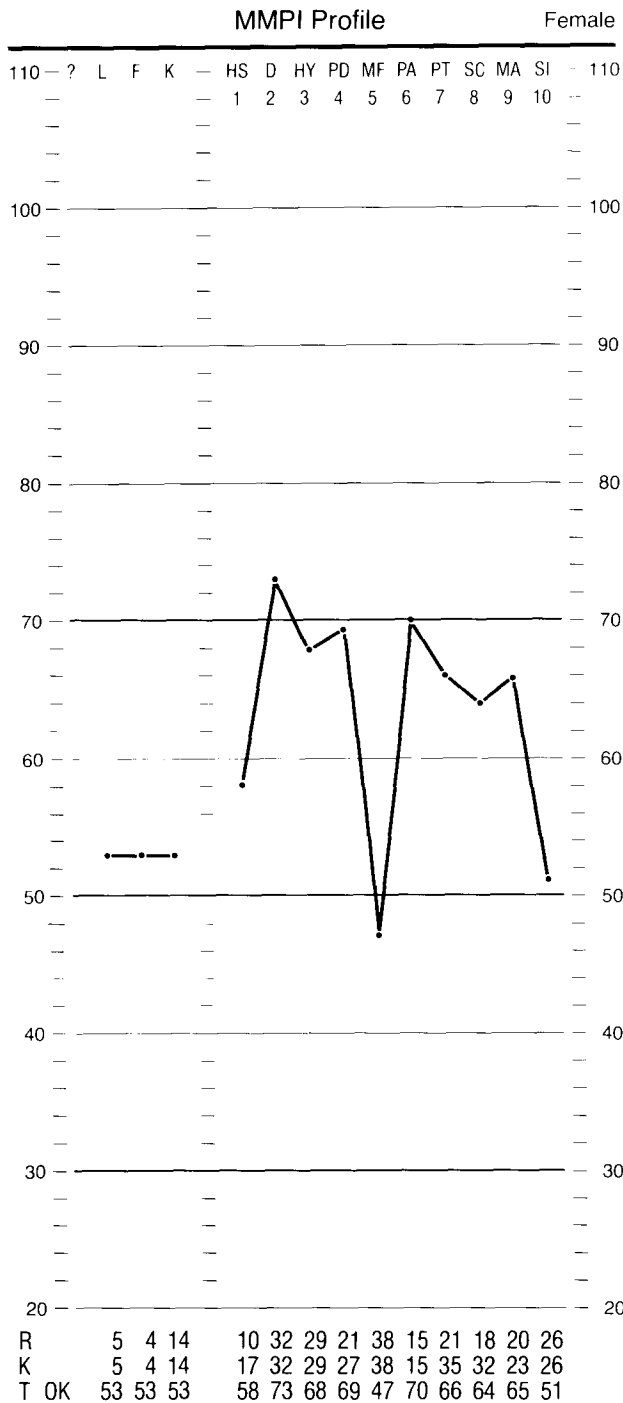
The issue here can be paraphrased as, "how 'comfortably' sick is the person?" The intent is to further refine the differentiation between pain behaviors organically controlled from those which may not be.

What to look for:

(a) Elevations on 2 and/or 2-subtle* (e.g., 65

*A useful rule of thumb in use of subtle/obvious subscores is: when obvious is over subtle, read the scale where the scale score is; when subtle is over obvious, read the scale where subtle is. For example, if 2-obvious is 75, 2 at 65, and 2-subtle at 55, read 2 as 65. If 2-obvious is 55, 2 at 65, and 2-subtle at 75, read 2 at 75.

Figure 2



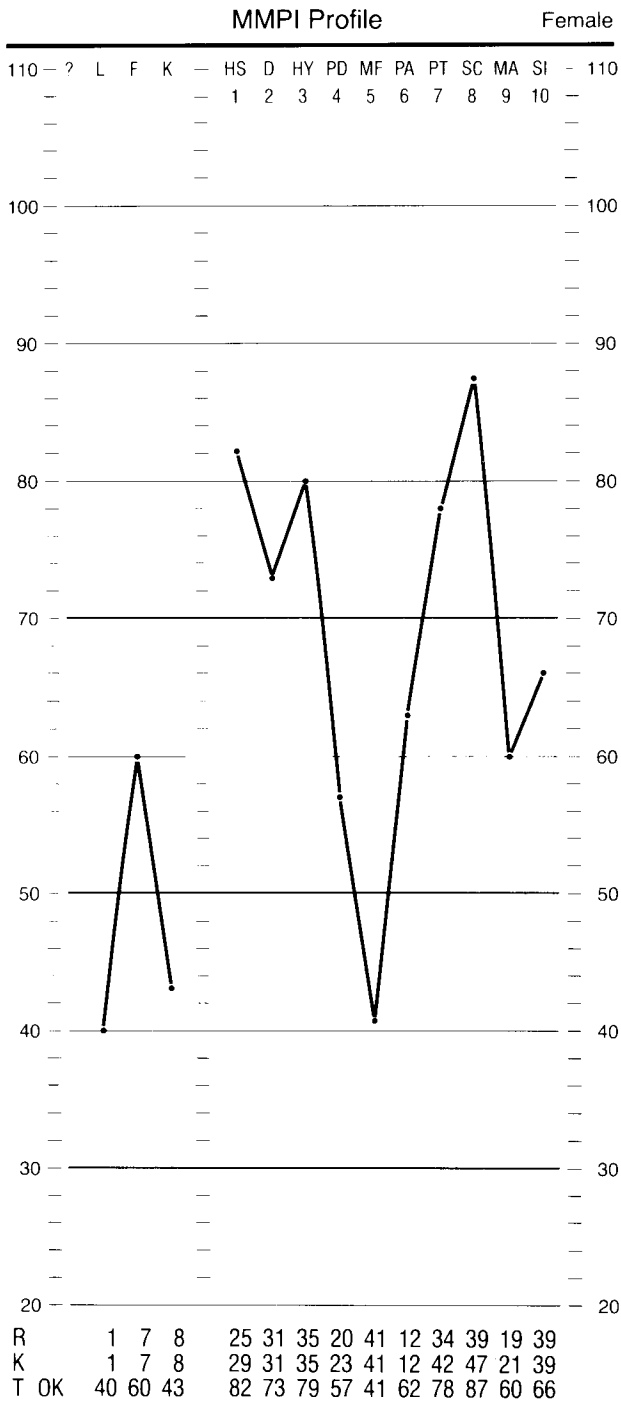
or more) suggest that the patient is unhappy, uncomfortable with his/her pain behaviors and hence is less likely to find them reinforcing. Thus, 2-3-1, 2-1-3, 3-2-1 coded profiles are less likely to indicate pain behaviors controlled by non-organic factors. The principal exceptions relate to over-all profile indications that the person has limited ability to cope with being well, a topic to be discussed further below. Profiles coded 1-3 or 3-1, with low 2 and low 2-subtle (the classic "conversion-V"), describe someone who has many somatic complaints but is not all that worried about them; hence may find the illness role yields reinforcement. It should be noted here that seeing a V shape to the left of the profile often leads the novice to talk about "conversion reaction." It should be evident from the preceding comments that the V shape should include an absolutely low 2 (or 2-subtle, if that is over 2), or it has little relevance.

Figure 3 shows a profile indicating much readiness to emit pain behaviors but also considerable distress about illness. This woman complained of headaches which rendered her unable to work. But she was post-encephalitic and workup indicated memory deficits and fine motor impairment from the encephalitis. Pain earned "time-out" from revealing cortical deficits. Scales 2, 7, and 8 should be contrasted with those of Figure 1.

(b) Elevations on 1 and 3, somewhat irrespective of 2, when accompanied by a very low 4 (e.g., below 50 and, aside from 5 and 0, the lowest clinical scale) describe a person having significant difficulty asserting him/herself or of coping with interpersonal demands except in a meek and submissive way. That person, while showing distress via a possibly high 2, also shows probable difficulty coping with being well. They may be differentiated from patients about whom one might otherwise say pain behaviors are psychologically costly and therefore more likely to be controlled by physical findings. For them, though 2 may be high, pain/illness can serve as a reinforcing buffer against environmental pressures.

(c) Profiles coded 1234, or having an elevated 1234 configuration, whatever the rest of the profile, typically describe a passive-dependent person; one who has considerable readiness to seek nurturance and

Figure 3

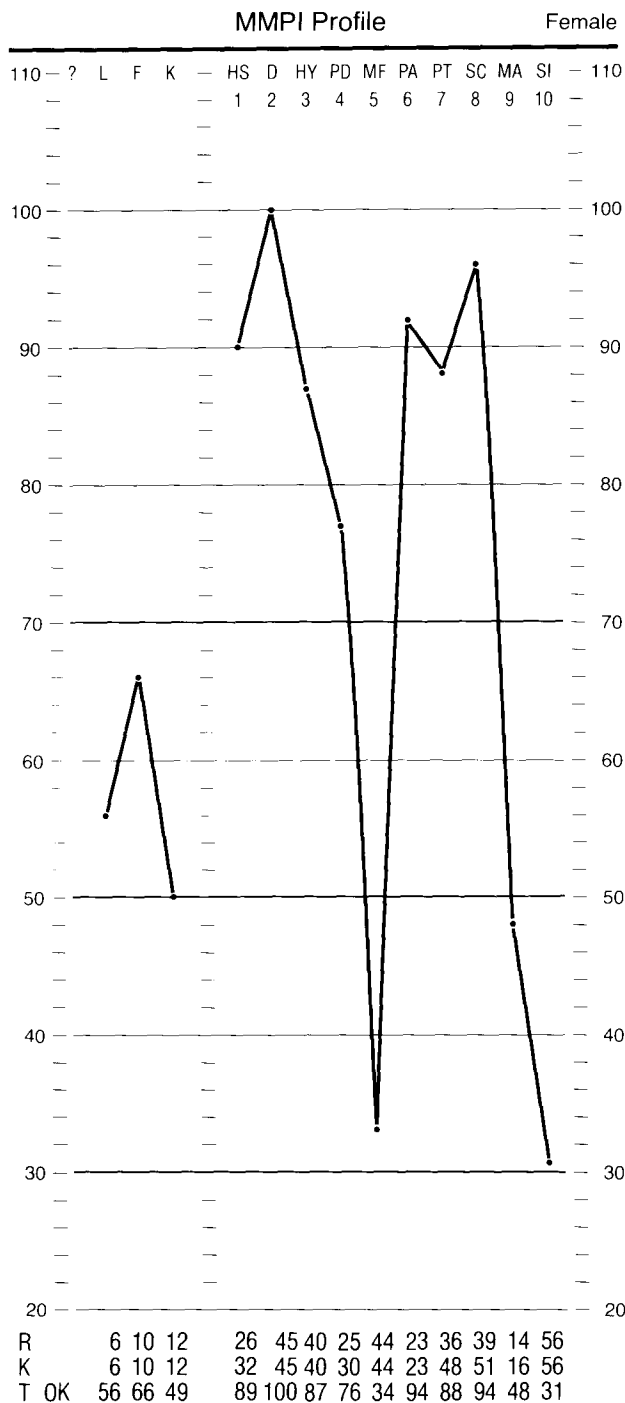


support from others. That kind of person, particularly if male, may well use pain behaviors to help attain support and shelter from responsibility demands. Here we have the high 1-3, but with 2 also elevated. But, given the 1234 configuration and the relative elevation of 4 itself, suggesting readiness to manipulate, passive-dependency and illness readiness are appropriate inferences. For such a person, pain/illness may not have a high response cost.

3. Are there other problems which make pain behaviors reinforcing, irrespective of how high or low scales 1 and 3 may be? The configurations and the related problems described in this section usually are accompanied by elevated 1 and 3, but not always.
 - (a) In illness, particularly chronic, one must always consider not only the indicators of illness but also indicators bearing on how likely the person will be able to cope with being well. To take an easy example, a profile with a "paranoid check" (6 over 7, with 8 at 80) in a non-random profile, gives strong evidence of psychotic functioning. It is not uncommon for such a person to seek the haven of illness; e.g., chronic pain. The recourse usually shows up via elevations also on 1 and 3, whether higher or lower than 6-8-7 or 8-6-7 configuration. Sometimes, however, particularly if the pain complaints are of recent origin, 1 and 3 may not yet be very high. But the profile indicates the person is probably in serious trouble in coping with daily living demands. Hence, indications such as the paranoid check, or any other configuration suggesting very significant emotional/personality disturbance, should be perceived as raising the possibility pain/illness has potential as a reinforcing haven. Particularly, here one looks for evidence of cognitive slippage or confusion, as in high 8 (usually also over 7), or of intense depression (2 up, 9 down; particularly, 9 subtle less than 9-obvious and below 50), or of acute and intense anxiety (elevations on 2 and 7, with or without 8, and usually with high 6-obvious).

Figure 4 describes a seriously disturbed woman. She had had multiple suicide attempts and several hospitalizations for depression. How much her "pain" was mislabelled depression and how much a sanctioning of withdrawal from social demands is difficult to determine. In

Figure 4



any event, her pain behaviors seemed to relate importantly to non-organic factors.

(b) Is the patient addicted to pain medications; usually narcotics, barbiturates, or muscle relaxants? A fascinating number of chronic pain patients who are addicted have been observed, when the addiction is cleared up, no longer to have a pain problem or pain complaints. What appears to have happened is that addiction means the person must emit pain behaviors to get the much needed "fix". It is a classical illustration of pain behaviors controlled by conditioning effects. On the MMPI, this usually shows up as elevated 2 and 9, particularly 9-subtle. When both are primed (i.e., $T \geq 70$), in the context of chronic pain, the likelihood of addiction is considerable. But with 2 up around 70 or more and 9 into the middle or high 60s, addiction remains a real possibility.

Figure 5 shows the profile of a highly toxic and addicted pain patient. Speech was slurred, ideas were presented in a rambling manner, and prescribed narcotics were being ingested at levels lethal to non-adapted persons. Note that 2 and 9 are both primed.

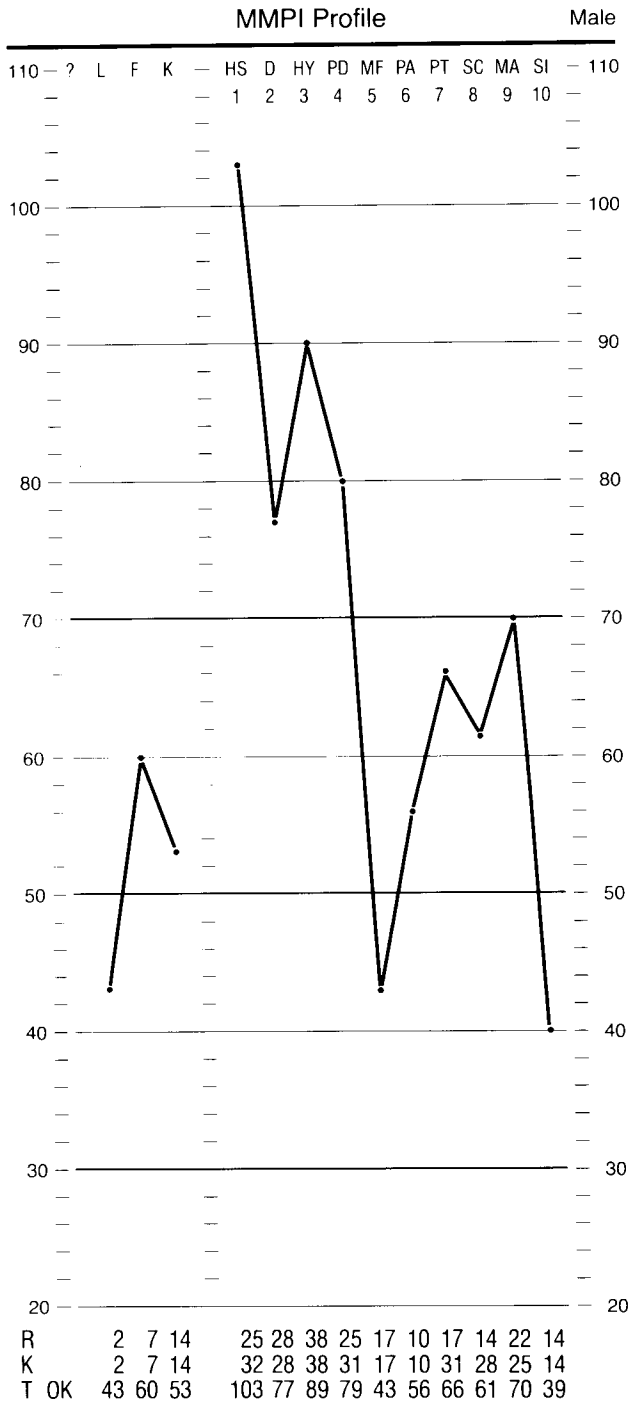
Any configuration indicating possible cognitive slippage (e.g., profiles like those found in so-called "organic brain syndrome") are also possible indicators of addiction and toxicity. Here one is looking for 2-9 or 8 high and over 7, or such indicators of disinhibition as high 4 and 9, accompanied by distress; e.g., 2-7.

A special problem arises in this context which should be noted. As stated previously, many elderly patients presenting with puzzling (or seemingly not so puzzling) problems of chronic pain are found to have cortical deficits instead. Accordingly, when assessing a pain patient beyond middle 50s in age, the matter of CNS involvement always should be considered. Particularly, any indications from the MMPI of cognitive slippage signal the need for neuropsychological assessment to further clarify the issue.

(c) It is rare in chronic pain settings to encounter an out and out malingerer. But it is not uncommon to encounter people locked into compensation / litigation games. Whatever the rest of the profile, there is usually considerable 4-9; e.g., into the middle and high 60s or beyond, particularly, 4-subtle and 9-subtle.

(d) Is the patient highly suggestible and sim-

Figure 5



ply over-responding either to modest levels of nociception (i.e., pain stimuli) or to information about the nature of an illness or injury received from physicians, family members, or others? This seems not very often to be the central problem but it can occur. It appears to show up on the MMPI in the form of hysteroid features, narrowly defined. There is high K, usually also high L. There is high 3, with 3-subtle over 3-obvious. The profile is usually coded 3-1, with 1 no higher than the low 60s. This suggestibility element more often is part of the broader spectrum of things found in 1-3 profiles.

4. Is the core problem depression mislabelled as pain?

Depression mislabelled as pain occurs nearly exclusively in elderly patients. It is, of course, very difficult to separate “chicken from egg.” The important thing to keep in mind is that elderly depressed people are more likely to report somatic components to their distress than are younger depressed people.

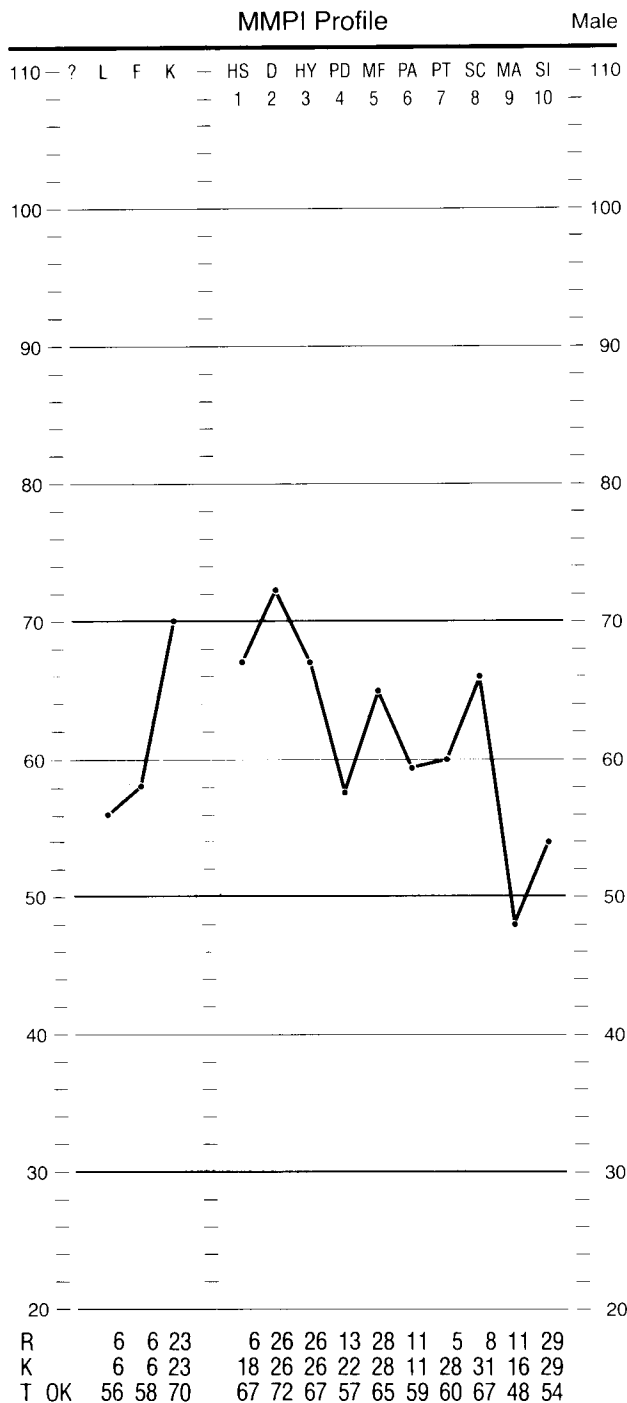
(a) What to look for: Scales 1 and 3 are likely to be elevated, along with the indicators of depression: 2 high, 9 low, with 9-subtle below 50. The MMPI cannot by itself differentiate the extent to which the somatic complaints relate to some body damage factor. The referring physician should be alerted to consider depression as an alternative possible explanation for the pain problem. A clinical workup for depression should also be done. This issue can arise in younger depressed patients, though rarely below age 35 or so. But when chronic pain complaints in, for example, a middle-aged person relate primarily to depression, the other indicators of a major problem of depression are usually very evident, both on the MMPI and in other ways.

Figure 6 shows a profile of a man presenting with a complaint of back pain which had inconsistent and selective effects on activities, suggesting considerable operant pain. He smiled constantly but gave ample evidence of significant underlying depression which appeared to be mislabelled as pain by patient, family, and referring physicians.

5. Does the pain problem have a significant tension component?

Tension as a significant component either

Figure 6



producing or helping to maintain pain behavior nearly always is limited to tension headaches or to high back, neck and shoulder complaints. In the latter cases, there is often a history of onset via a whiplash injury, or some variant thereof. Tension, by itself, is not often a significant factor in low back pain, abdominal pain, or extremity pain.

(a) What to look for: MMPI indicators of tension are mainly two: (1) A Low Back Pain (LBP) score elevation of 50 or more (i.e., raw score of 13 or more); though occasionally raw scores as low as 11 will accompany significant tension problems. (2) Profile indicators of marked anxiety; e.g., 2-7 high, particularly with 6-obvious primed.

6. Is the pain problem a phobic-like phenomenon; e.g., a variant of "traumatic neurosis?"

This bit of clinical lore is presented with some trepidation. There are, as yet, so far as the author knows, no formal supporting data. However, there have been enough clinical encounters, including three cases successfully treated on this basis, to warrant mentioning the issue.

(a) What to look for: MMPI indicators of phobic-like behavior are usually found via an elevated 7 with a sharp drop to 8; e.g., 7-8 T-score difference of 10 or more points. Indicators may also show up in the configurations previously mentioned as "suggestible;" i.e., high L, high K, high 3 with 3-subtle over 3-obvious and near 70 or higher, and a low 1. When there are suggestions that the problem may be pain-phobic in nature, the indicated further assessment step is to explore, via detailed interview, specific discriminated environmental stimuli which reliably elicit the pain behaviors. Those environmental stimuli usually relate to physical activities but other physical activities of roughly equivalent physical demands do not result in pain behaviors.

Other Referral Questions

Some surgeons will request MMPIs before operating to obtain an assessment of the likelihood of the success of surgery. In such cases, the question is some mix of two separate but related questions: (1) are the pain behaviors under essential control of nociception relating

to body damage? and (2) given a reduction in nociception, how likely is this person to find pain behaviors so reinforcing that they will persist?

The first of those questions is exactly equivalent to the first referral question considered above. Reference should be made back to that discussion. The second question can be paraphrased as "Assuming surgery is successful, will my patient also get better and stay that way?" That question can also be dealt with in terms of the preceding diagnostic issues considered. The essence of the matter is: are pain behaviors reinforcing? The more the indications that illness has "payoff" for the person, the less likely any physically based treatment intervention, including surgery, conservative regimens, traction, electrical stimulation, etc., will suffice. Similarly, the less likely acupuncture, hypnosis, or psychotherapy will produce lasting benefit. Treatment must necessarily be directed toward modifying the contingencies to sick and well behavior, as well as getting the patient mobilized to an adequate activity level.

Court actions relating to pain problems often arise. Usually, the essential question facing the MMPI interpreter is: what is the evidence pain behaviors are presently occurring for reasons other than the body trauma which originated the problem? The points expressed in sections 1-6 above provide the basis for MMPI response to that issue. There is, of course, a related legal issue, about which the MMPI can say little. That is: if it is given that body damage trauma caused the pain problem and that current evidence indicates the ensuing pain behaviors have now come under essential control of conditioning effects or are maintained by various environmental contingencies, to what extent is there liability for the current pain problem? That is not an MMPI issue and the MMPI user should be mindful of that. He/she can only testify to the probability that factors other than the originating physical findings are influencing persistence of the pain behaviors.

Treatability:

Studies have been directed at predicting treatment outcome via the MMPI. These studies have limited utility because the "treatment(s)" used are usually insufficiently specified, as are the selection criteria, to permit meaningful predictors to arise. A partial exception to this point relates to the earlier discussion of predicting success from surgery.

There will be no attempt here to identify MMPI predictors of probable success of treatment (aside from the surgery issue), except in a very limited way.

In addressing the question of whether treatment gains will be maintained, two issues can be considered.

- (a) to what extent is the person, newly restored to activity and the responsibility demands of "being well," likely to be able to cope? The points raised in sections 1-3 above deal with that.
- (b) to what extent will increased activity level (quite aside from the matter of ability to deal with responsibility demands) itself be reinforcing? This proves to be a simple question but one which is often highly relevant. The critical elements are MMPI indicators of restlessness, energy, activity level, or a self-demanding life style. Thus, the patient somewhat immobilized by his/her pain problem but who shows elevations on scale 9 or 2-7 (accompanied by K scores well over 50) is likely to find access to activity highly reinforcing.

To summarize, the MMPI can make a very useful contribution to the assessment of chronic pain. That contribution must be based on a clear understanding of the complex character of chronic pain and of the assessment questions appropriately asked of the MMPI interpreter. The effectiveness of the MMPI in this context can be no greater than the ability of the interpreter to use it properly.

References Cited

- Fordyce, W.E. *Behavioral methods in chronic pain and illness*. St. Louis: C. V. Mosby, 1976.
- Fordyce, W.E. Evaluating and managing chronic pain. *Geriatrics*, 1978, 33, 59-62.
- Johnson, A.D. The problem claim, an approach to early identification. Department of Labor & Industries, State of Washington, 1978, Mimeo.
- Sternbach, R.A. *Pain patients: Traits and treatments*. New York: Academic Press, 1974.
- Wiltse, L.L. & Rocchio, P.D. Preoperative psychological tests as predictors of success of chemonucleolysis in the treatment of low back syndrome. *Journal of Bone and Joint Surgery*, 1975, 57-A, 478-483.

Other Relevant Publications

- Calsyn, D.A., Louks, J., & Freeman, C.W. The use of the MMPI with chronic low back pain patients with a mixed diagnosis. *Journal of Clinical Psychology*, 1976, 32, 532-536.
- Calsyn, D.A., Spengler, D.M., & Freeman, C.W. Application of the somatization factor of the MMPI-168 with low back pain patients. *Journal of Clinical Psychology*, 1977, 33, 1017-1020.
- Fordyce, W.E. Learning processes in pain. In Sternbach, R.A. (Ed.), *The psychology of pain*. New York: Raven Press, 1978.
- Fordyce, W.E., Brena, S.F., Holcomb, R.F., De Lateur, B.J., & Loeser, J.C. Relationship of patient semantic pain descriptions to physician diagnostic judgments, activity level measures and MMPI. *PAIN*, 1978, 5, 293-303.
- Freeman, C.W., Calsyn, D.A., & Louks, J. The use of the Minnesota Multiphasic Personality Inventory with low back pain patients. *Journal of Clinical Psychology*, 1976, 32, 294-299.
- Gentry, W.D., Shows, W.D., & Thomas, M. Chronic low back pain: A psychological profile. *Psychosomatics*, 1974, 15, 174-177.
- Gottlieb, H., Strite, L.C., Koller, R., Madarsky, A., Hockersmith, V., Kleeman, M. & Wagner, J. Comprehensive rehabilitation of patients having chronic low back pain. *Archives of Physical Medicine and Rehabilitation*, 1977, 58, 101-108.
- Greenhoot, J.H. & Sternbach, R.A. Conjoint treatment of chronic pain. *Advances in Neurology*, 1974, 4, 595-603.
- Hanvik, L.J. MMPI profiles in patients with low back pain. *Journal of Consulting Psychology*, 1951, 15, 350-353.
- Krusen, E.M., & Ford, D.E. Compensation factor in low back injuries. *Journal of the American Medical Association*, 1958, 166, 1128-1133.
- Louks, J.L., Freeman, C.W. & Calsyn, D.A. Personality organization as an aspect of back pain in a medical setting. *Journal of Personality Assessment*, 1978, 42, 152-158.
- Maruta, T., Swanson, D.W., & Swenson, W.M. Low back pain patients in a psychiatric population. *Mayo Clinic Proceedings*, 1976, 51, 57-61.
- McCreary, C., Turner, J., & Dawson, E. Differences between functional versus organic low back pain patients. *PAIN*, 1977, 4, 73-78.
- Phillips, E.L. Some psychological characteristics associated with orthopaedic complaints: *Current Practices in Orthopedic Surgery*, 1964, 2, 165-176.
- Pilling, L.F., Brannick, T.L. & Swenson, W.M. Psychological characteristics of psychiatric patients having pain as a presenting symptom. *Canadian Medical Association Journal*, 1967, 97, 387-394.
- Shaffer, J.W., Nussbaum, K., & Little, J.M. MMPI profiles of disability insurance claimants. *American Journal of Psychiatry*, 1972, 129, 403-407.
- Sternbach, R.A., Murphy, R.W., Akeson, W.H., & Wolf, S.R. Chronic low back pain: The "low back loser." *Postgraduate Medicine*, 1973, 53, 135-138.
- Sternbach, R.A., & Timmermans, G. Personality changes associated with reduction of pain. *PAIN*, 1975, 1, 177-181.
- Swanson, D.W., Swensen, E.M., Maruta, T., & McPhee, M.C. Program for managing chronic pain. *Mayo Clinic Proceedings*, 1976, 51, 401-408.
- Timmermans, G., & Sternbach, R.A. Factors of human chronic pain: An analysis of personality and pain reaction variables. *Science*, 1974, 184, 806-808.
- Thomas, M.R., & Lyttle, D. Development of a diagnostic checklist for low back pain patients. *Journal of Clinical Psychology*, 1976, 32, 125-129.
- Towne, W.S., & Tsushima, W.T. The use of the low back and dorsal scales in the identification of functional low back patients. *Journal of Clinical Psychology*, 1978, 34, 88-91.
- Wilfling, F.J., Klonoff, H., & Kokan, P. Psychological, demographic and orthopaedic factors associated with prediction of outcome of spinal fusion. *Clinical Orthopedics*, 1973, 90, 153-160.