

The efficiency of MMPI-2 validity scales in detecting malingering of mixed anxiety-depressive disorder

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Abstract - The aim of this study was to examine the efficiency of the validity scales (F, Fb, Fp, F-K, K, L, S, VRIN and TRIN) of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) in the detection of malingering mixed anxiety-depressive disorder and the possibility of differentiating between groups of persons with mixed anxiety-depressive disorder and persons instructed to malingering the mixed anxiety-depressive disorder on the basis of basic and content scales. The participants in the study were 47 persons diagnosed with mixed anxiety-depressive disorder and 47 female psychology students who received a description of the mixed anxiety-depressive disorder as well as information on the MMPI-2 validity scales. The students were asked to malingering the mixed anxiety-depressive disorder and to do so in such a manner as to avoid detection. The results of discriminant analysis have shown that the validity scale Fp is the most effective in revealing malingering profiles, followed by the Fb scale, the F-K index and the F scale. The S, K and VRIN scales revealed a lower negative correlation with the discriminant function, which was expected in view of their purpose (fake good). The accuracy of the classification based on the validity scales results was very high (97.9% of persons with anxiety-depressive disorder and 97.9% of malingeringers were correctly classified). The L and TRIN scales were not found to be significant in differentiating between the malingeringer's profiles and those of persons with the disorder. Discriminant analysis was used to determine the possibility of differentiating profiles from the basic scales and content scales, where the content scales LSE, SOD and TRT and the basic scales Si and Pd proved to be the most efficient in differentiating between malingeringer profiles and those of persons with anxiety-depressive disorder. The accuracy of classifying the malingeringer's profiles and those of persons with anxiety-depressive disorder based on basic scale and content scale results was also high (91.5% of persons with anxiety-depressive disorder and 97.9% of students were correctly classified).

Key words: malingering, mixed anxiety-depressive disorder, MMPI-2, validity scales, basic scales, content scales

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Introduction

Personality inventories are often administered in psychodiagnostic evaluation due to the fact that they are relatively economical, simple to administer and can be scored

completely objectively. One of the problems in the use of these inventories (as with the use of the interview) is the tendency of some persons to present themselves better or worse than they actually are. Some situations, child custody cases or professional selection, for example, may induce a person to present themselves in a more positive light and to avoid those responses which may indicate psychopathology. In other situations, some persons may, consciously, others unconsciously, present themselves in a more negative light than is true of them. Highly anxious persons with regressive function patterns, experiencing significant anxiety and other negative feelings may unconsciously overreport symptoms, using this method to seek help [1-2]. However, in situations where it is possible to gain a certain advantage (e.g., financial benefits or avoiding responsibility in forensic processing) it can be presumed that the person is highly motivated to display various symptoms and that they are aware of this. In cases when a person displays symptoms they are not experiencing, overreport existing symptoms, or assigns the symptoms to a cause which is known not to be related to the symptoms, we can use the term malingering [3]. Persons who malingering symptoms often report symptoms which are rare in clinical samples, improbable symptoms (extreme variants of rare symptoms), symptoms which rarely occur together, a large number of symptoms they consider to be severe and symptoms they consider to be indicative of psychological disorders. However, it is clear that the manner of malingering a psychological disorder will depend on the person's knowledge and the stereotypes of persons about the disorder [4].

In comparison with data collected in the interview, where the assessment of malin-

gering is based on the clinician's judgment, many self-report measures have a distinct advantage because of the incorporated validity scales which aid in determining response style. The Minnesota Multiphasic Personality Inventory-2 (MMPI-2 [5-6]) includes three Infrequency scales [F (Infrequency) Scale, Fb (Back Infrequency) Scale and the Infrequency – Psychopathology (Fp) Scale] which are used to determine the tendency of providing rare responses or listing rare and improbable symptoms. Apart from these scales, the F-K index (Gough Dissimulation Index) was developed for the MMPI-2, with additional scales for determining a persons' tendencies toward defensive responding, minimization and denying psychopathology [12].

The Infrequency Scale F and the Back Infrequency Scale Fb include responses which persons from the normative group (healthy population) rarely endorse in the direction in which they are scored. The consequence of this is the fact that, not only the malingerers, but also persons with severe disorders such as schizophrenia, depression, posttraumatic stress disorder, personality disorders and organic brain damage may have elevated results [13-17]. The Infrequency – Psychopathology Scale (Fp), constructed for the purpose of surpassing the deficiencies of the F and Fb scales, includes responses rarely endorsed by healthy persons and those with clinical disorders in the direction they are scored. This scale aids in the explanation of elevated scores on the F and Fb scales, that is, in differentiating cases where elevated scores on the F and Fb scales are the result of malingering from those where the scores are the result of severe psychopathology.

There are numerous studies which have confirmed the efficiency of the validity scales in differentiating the MMPI-2 profiles of

persons instructed to malingering disorders and the profiles of actual patients. The studies involved a group which was given information on the symptoms and/or information on validity scales, and a group from which this information was withheld [18-25]. The majority of these studies confirmed the efficiency of infrequency scales in the detection of malingering, while the effects of providing information on the symptoms and/or on validity scales were not always the same. Some studies revealed that providing information on the specific disorder was relatively inefficient in successfully malingering the disorder on the MMPI-2, while information on the validity scales greatly facilitated the malingering of the disorder.

The majority of the research is focused on disorders such as depression, schizophrenia and posttraumatic stress disorder, while others required the participants to present themselves as generally maladjusted persons. Despite indications that it would be easier to malingering non-psychotic mental disorders and pass undetected (due to the fact that the Infrequency scales, particularly F and Fb include very heterogeneous content, more often connected with severe psychopathology such as paranoid thoughts, confusions, disorganization, hostility, dissociative experiences etc.), we are not aware of studies where the participants would be asked to malingering a mixed anxiety-depressive disorder, thus resulting in the motive for this study.

The aim of the study was to determine whether the MMPI-2 validity scales can be effective in differentiating actual and malingering mixed anxiety-depressive disorder and whether the results for basic and content scales differ for persons with actual diagnosed mixed anxiety-depressive disorder and

participants who malingering the disorder on the MMPI-2.

Method

Participants

Participants in this study are 47 first and second year female undergraduate psychology students (who had not encountered the MMPI-2 and psychopathology in their curriculum) and 47 women diagnosed with mixed anxiety-depressive disorder. The age of the students ranged from 19 to 24 years ($M = 20.05$, $sd = 1.436$), while the age of persons diagnosed with mixed anxiety-depressive disorder ranged from 19 to 53 years ($M = 32.52$, $sd = 1.436$).

Instruments

The Minnesota Multiphasic Personality Inventory-2 (MMPI-2 [5-6]) is the most widely used objective personality inventory in clinical practice and research. It is intended for use in the assessment of psychopathological difficulties and personality related problems in persons over the age of 18. It is composed of 567 items, where participants choose between a "correct" and an "incorrect" response to the given statements. It can be administered individually or in a group and scoring is completely objective. Of particular value in this inventory are the validity scales (L, F, K, Fb, Fp, VRIN, TRIN, S) which allow for the determination of valid and invalid protocols, indicating a participants tendency to present their state as better/worse than it actually is. Statements from this inventory are classified into 10 clinical or basic scales (Hs, D, Hy, Pd, Mf, Pa, Pt, Sc, Ma and Si), 15 content scales (ANX, FRS, OBS, DEP, HEA, BIZ, ANG, CYN, ASP, TPA, LSE, SOD,

FAM, WRK, TRT), content components and supplementary scales. Restructured clinical scales have also been developed, as well as The Personality Psychopathology-Five (PSY-5) Scales and there have been attempts to develop personality disorder scales. [7-9] Numerous studies have focused on the development of additional indices, such as the Goldberg index for differentiating neurotic and psychotic disorders and the F-K dissimulation index which was developed by Gough in 1956 for the original MMPI and is present in the MMPI-2 [10].

Internal consistency coefficients (alpha) for validity scales range between 0.57 and 0.74, for clinical scales between 0.39 and 0.87 and for content scales between 0.72 and 0.86.

Procedure

Testing was conducted in a group setting at the University facilities, and the results for psychiatric patients were gathered during regular psychodiagnostic procedures in a general hospital, where the Ethics committee approved their use. The students signed informed consent forms prior to testing. The inventory was administered using standard instructions listed in the Manual for the clinical sample, while instructions for the students were altered. The students were instructed on the characteristics of anxiety-depressive disorder and the purpose of the validity scales and were asked to falsely present themselves as persons with anxiety-depressive disorder while avoiding detection on the validity scales. As a further motivation, those who were successful in “fooling” the test were promised credit in the form of experiments hours (which are mandatory).

The instructions given to the students were:

“Almost all persons occasionally and in certain life situations experience anxiety, feel nervous and in a bad mood, as normal reactions to stressful situations. However, in persons whose daily functioning, social activities and relationships are hindered by anxiety and depressed moods, it is highly probable that they have a mixed anxiety-depressive disorder.

Persons with this disorder present symptoms of anxiety and depression, which are not severe enough for the diagnosis of specific anxiety or mood disorder. Mixed anxiety-depressive disorder is characterized, firstly, by constant and repeated mood swings lasting for at least a month. Changes in mood are accompanied by at least four of the following symptoms: difficulties in concentration, fatigue, lack of energy, sleep disorders, concern, irritability, tearfulness, pessimistic view of the future, feelings of inadequacy, low self-esteem and anxiety. Persons suffering from this disorder believe that something will go wrong and lack confidence in their own abilities. Their lives become a constant state of concern. In addition, the disorder is frequently accompanied by various physical symptoms such as headaches, fatigue, insomnia, loss of appetite, digestion disorders etc. Mood changes can also be manifested through excessive consumption of alcohol and over-concern about physical symptoms.

You have in front of you a questionnaire intended for determining a wide range of psychological disorders. It is an instrument of high validity, whose scales can reveal various response styles with special emphasis on the detection of distorted responses, over-reporting or accentuation of non-existent problems, denial of existing symptoms and inconsistent responding.

Your task is to attempt to “fool” this inventory, completing it by pretending that you

suffer from mixed anxiety-depressive disorder, that your psychological state is very poor and that you wish to receive the appropriate hospital treatment, keeping in mind the aforementioned symptoms which are characteristic of this disorder. It is also very important to keep in mind the characteristics of this instrument and to avoid detection. You are to complete the inventory by indicating whether each statement is true or false for you as a person with mixed anxiety-depressive disorder and to mark your response on the answer sheet.

Participation is completely anonymous and your responses will be used exclusively for scientific purposes. Your cooperation is very important to us, so please respond to the questions in accordance with the given instructions. Participation is voluntary and

you can withdraw at any time. Experimental credit will be given only to those who successfully fool the test. Thank you for your participation. You may begin.”

Statistics

We used discriminant analysis to determine which variables will significantly contribute to distinguishing between students and actual patients. All of the statistical analysis was conducted using IBM SPSS 21, a statistical program for the social sciences.

Results

The first discriminant analysis was conducted to determine which validity scales significantly contribute to distinguishing between student's profiles and those of actual

Table 1 Arithmetic means (M) and standard deviations (SD) in results (T-values) for persons with mixed anxiety-depressive disorder and students for validity scales, F-K index, basic scales and content scales

| Variables | Anxiety- depressive disorder | | Students | |
|-----------|------------------------------|--------|----------|--------|
| | M | SD | M | SD |
| L | 54.49 | 11.867 | 50.19 | 10.150 |
| F | 72.85 | 22.855 | 115.91 | 16.430 |
| K | 44.45 | 10.650 | 36.28 | 5.352 |
| Fb | 70.57 | 22.697 | 119.49 | 1.792 |
| Fp | 60.89 | 15.192 | 114.00 | 10.909 |
| S | 43.15 | 9.378 | 32.17 | 3.137 |
| VRIN | 58.51 | 9.890 | 51.53 | 11.693 |
| TRIN | 61.72 | 11.338 | 57.40 | 9.026 |
| F-K | -1.79 | 11.602 | 28.40 | 12.573 |
| Hs | 70.68 | 12.303 | 88.87 | 11.469 |
| D | 70.77 | 15.309 | 44.60 | 10.427 |
| Hy | 71.62 | 14.557 | 82.47 | 10.816 |
| Pd | 60.09 | 12.367 | 89.15 | 12.640 |

Table 1 (Continued from previous page)

| Variables | Anxiety- depressive disorder | | Students | |
|-----------|------------------------------|--------|----------|--------|
| | M | SD | M | SD |
| Mf | 57.87 | 8.948 | 57.96 | 8.873 |
| Pa | 62.32 | 17.846 | 97.23 | 18.202 |
| Pt | 67.66 | 15.983 | 91.40 | 8.948 |
| Sc | 67.81 | 16.242 | 79.28 | 34.687 |
| Ma | 57.70 | 13.038 | 66.32 | 12.132 |
| Si | 57.64 | 11.855 | 80.40 | 6.974 |
| ANX | 65.66 | 13.539 | 83.45 | 5.445 |
| FRS | 61.57 | 14.398 | 80.85 | 16.851 |
| OBS | 61.45 | 13.740 | 77.72 | 7.276 |
| DEP | 66.49 | 14.588 | 90.00 | 5.449 |
| HEA | 68.11 | 14.198 | 93.00 | 12.641 |
| BIZ | 62.45 | 14.822 | 89.30 | 18.646 |
| ANG | 57.02 | 12.927 | 73.45 | 9.713 |
| CYN | 58.96 | 12.167 | 72.21 | 8.094 |
| ASP | 57.04 | 10.340 | 75.57 | 11.110 |
| TPA | 56.49 | 12.717 | 68.28 | 12.715 |
| LSE | 62.02 | 12.014 | 88.62 | 5.885 |
| SOD | 52.45 | 12.991 | 80.74 | 7.900 |
| FAM | 56.09 | 13.466 | 83.28 | 15.785 |
| WRK | 65.81 | 14.957 | 92.51 | 6.372 |
| TRT | 66.85 | 15.249 | 95.81 | 5.705 |

patients. The second discriminant analysis was conducted to determine which basic scales and content scales contribute to distinguishing between groups.

Table 1 shows the arithmetic means and standard deviations for persons diagnosed with mixed anxiety-depressive disorder and students for validity scales, basic scales and content scales.

The profiles of persons with mixed anxiety-depressive disorder and students who

malingered this disorder (Figure 1) show that the students obtained highly elevated results on the Infrequency, Back Infrequency and Infrequency-Psychopathology (F, Fb and Fp) scales and the F-K index in this group is very high (Table 1). This response style also resulted in high elevations on all content and basic scales, except for the Masculinity-Femininity Scale (Mf) (Figures 1 and 2).

Tables 2 to 6 show the results of the first discriminant analysis which included nine va-

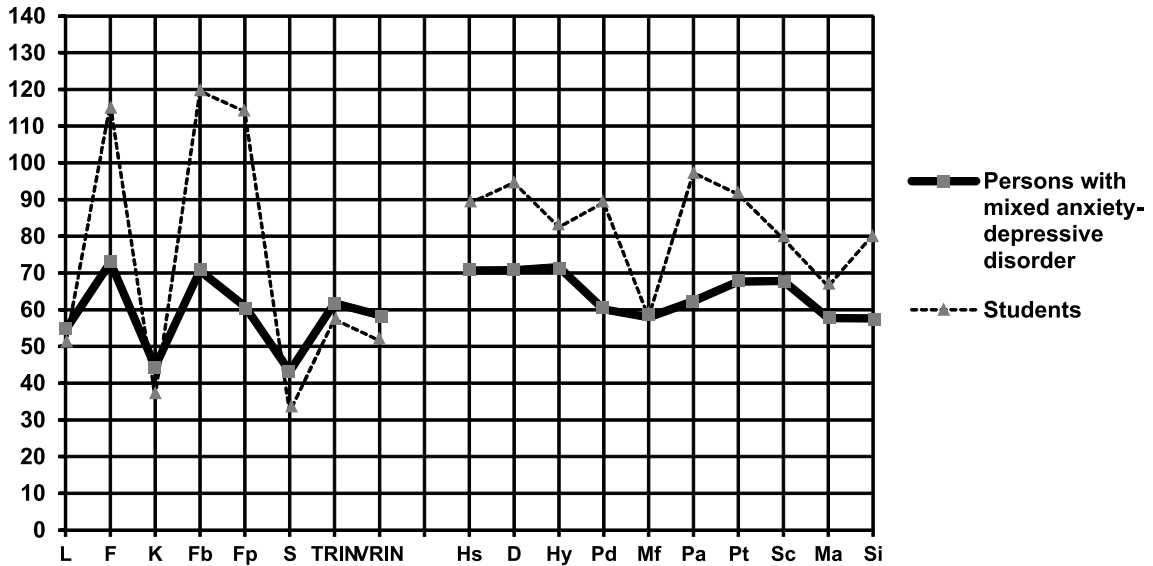


Figure 1 Validity and basic scales profiles for persons with mixed anxiety-depressive disorder and students who malingered this disorder

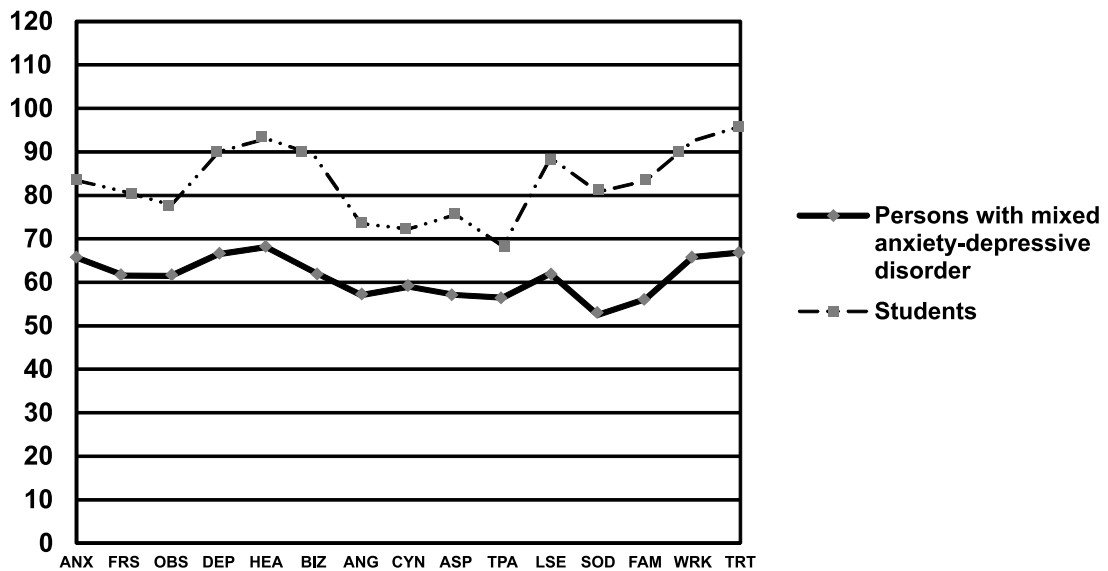


Figure 2 Content scales profiles of persons with mixed anxiety-depressive disorder and students malingering this disorder. Discriminant analysis resulted in a high canonical correlation (0.91), indicating a close relationship between the results on the discriminant function and group membership, indicating a high efficiency of MMPI-2 validity scales in discriminating between the two groups.

Table 2 Eigen values, percentage of explained variance, canonical correlation coefficients, Wilks' lambda, chi square (χ^2), degrees of freedom (df) and the statistical significance of the discriminant function (p) (persons with mixed anxiety-depressive disorder and students) for validity scales

| Function | Eigen-values | % of explained variance | Canonical correlation | Wilks' lambda | χ^2 | df | p |
|----------|--------------|-------------------------|-----------------------|---------------|----------|----|-------|
| 1 | 5.095 | 100 | 0.91 | 0.164 | 158.161 | 9 | 0.001 |

Validity indicators: validity scales (L, F, K, Fb, Fp, S, VRIN, TRIN) and the F-K index, resulting in a statistically significant discriminant function.

Of all the applied validity indicators, the Lie Scale (L) and True Response Inconsistency (TRIN) Scale were not significant. The results for both groups on these scales were in the average range.

The F, Fb, Fp, K and S scales and the F-K index significantly contribute to discrimination between the groups ($p < 0.001$). The Variable Response Inconsistency Scale (VRIN) is a significant variable in discrimination between groups but at a significance level of $p < 0.002$ (Table 3).

The structure matrix (Table 4) shows a high correlation between Fp scale and the discriminant function, indicating the greatest contribution of Fp scale to differentiating between groups. Scales Fb and F and the F-K index have a moderate positive correlation with discriminant function, while the S scale is moderately negatively correlated with the discriminant function and significantly contributes to the differentiation between groups. The K and VRIN scales show a low but significant negative correlation with the discriminant function and have the lowest contribution in differentiating between groups.

Table 3 Validity scales in analysis

| Variables | F-ratio | Wilks' lambda |
|-----------|---------|---------------|
| F | 110.011 | 0.455 |
| K | 22.084 | 0.806 |
| Fb | 216.938 | 0.298 |
| Fp | 378.949 | 0.195 |
| S | 57.927 | 0.614 |
| VRIN | 9.759 | 0.904 |
| F-K | 146.378 | 0.386 |

Table 4 Structure matrix for validity scales (persons with mixed anxiety-depressive disorder and students)

| Variables | Function |
|-----------|----------|
| | 1 |
| Fp | 0.899 |
| Fb | 0.680 |
| F-K | 0.559 |
| F | 0.484 |
| S | -0.352 |
| K | -0.217 |
| VRIN | -0.144 |

The values of group centroids (Table 5) show that students achieve significantly higher scores on the Fp, Fb and F validity scales and a significantly higher F-K index than persons with mixed anxiety-depressive disorder. The students achieved significantly lower scores on the S, K and VRIN scales than persons with mixed anxiety-depressive disorder.

Based on the results obtained on the Fp, Fb, F, S, K and VRIN scales and the F-K index, it is possible to correctly classify 46 (97.9%) of the 47 patients with mixed anx-

xiety-depressive disorder and 46 (97.9%) of the 47 students, which is a significant advantage in relation to classification at a chance.

Tables 7 to 11 present the results of the second discriminant analysis which includes basic scales and content scales. This analysis also resulted in a statistically significant discriminant function ($p < .001$).

The canonical correlation coefficient was very high in this discriminant analyses (0.91), confirming the high discriminant power of

Table 5 Group centroids for validity scales (persons with mixed anxiety-depressive disorder and students)

| Group | Function |
|--------------------|----------|
| | 1 |
| Students | 2.233 |
| Anxiety-depressive | -2.233 |

Table 6 The accuracy of aposterior classification (persons with mixed anxiety-depressive disorder and students)

| Group | Anxiety - depressive | Students |
|--------------------|----------------------|------------|
| Anxiety-depressive | 46 (97.9%) | 1 (2.1 %) |
| Students | 1(2.1%) | 46 (97.9%) |

basic and content scale scores in discriminating between groups (Table 7).

The Mf and Sc basic scales were the only two not statistically significant. The basic scales: Hs, D, Hy, Pd, Pa, Pt, Ma and Sc and all content scales significantly contribute to the discrimination between groups (Table 8).

The structure matrix (Table 9) shows that the LSE, SOD and TRT content scales have the highest correlation with the discriminant function, i.e. have the greatest contribution in differentiating between the group of students and persons with mixed anxiety-depressive disorder. The Hs, D, Pd, Pa, Pt, Si basic scales and the ANX, OBS, DEP, HEA, ASP, BIZ, ANG, CYN, FAM and WRK content scales have a moderate correlation with the discriminant function and represent a significant contribution to the differentiation

between groups. The FRS and TPA content scales and the Hy and Ma basic scales, despite being significant, have the lowest contribution to group differentiation.

The group centroid values for participant groups (Table 10) show that students achieve significantly higher results on the Hs, D, Hy, Pd, Pa, Pt, Ma and Si basic scales and on all content scales than persons with mixed anxiety-depressive disorder.

The accuracy of classification (Table 11), based on results of eight basic scales and all content scales, is high: 43 (91.5%) of 47 persons with mixed anxiety-depressive disorder and 46 (97.9%) of 47 students were accurately classified, which represents a significant advantage in comparison to classification at a chance.

Table 7 Eigen-values, percentage of explained variance, canonical correlation coefficients, Wilks' lambda, chi square (χ^2), degrees of freedom (df) and (p) statistically significant discriminant function (persons with mixed anxiety-depressive disorder and students) on basic scales and content scales

| Function | Eigen-values | % of explained variance | Canonical correlation | Wilks' lambda | χ^2 | df | P |
|----------|--------------|-------------------------|-----------------------|---------------|----------|----|-------|
| 1 | 4.599 | 100 | .906 | 0.179 | 137.812 | 24 | 0.001 |

Table 8 Basic scales and content scales in analysis

| Variables | F-ratio | Wilks' lambda |
|-----------|---------|---------------|
| Hs | 54.979 | 0.626 |
| D | 77.793 | 0.542 |
| Hy | 16.827 | 0.845 |
| Pd | 126.950 | 0.420 |
| Pa | 88.174 | 0.511 |
| Pt | 78.979 | 0.538 |
| Ma | 11.057 | 0.893 |
| Si | 128.766 | 0.417 |
| ANX | 69.826 | 0.569 |
| FRS | 35.551 | 0.721 |
| OBS | 51.513 | 0.641 |
| DEP | 107.124 | 0.462 |
| HEA | 80.658 | 0.533 |
| BIZ | 59.724 | 0.606 |
| ANG | 48.501 | 0.655 |
| CYN | 38.668 | 0.704 |
| ASP | 70.078 | 0.568 |
| TPA | 20.191 | 0.820 |
| LSE | 185.768 | 0.331 |
| SOD | 162.796 | 0.361 |
| FAM | 80.722 | 0.533 |
| WRK | 126.779 | 0.421 |
| TRT | 148.682 | 0.382 |

Discussion

The aim of the study was to determine whether the MMPI-2 validity scales can be effective in differentiating actual and malingered mixed anxiety-depressive disorder and whether the basic and content scales scores differ for persons with actual diagnosed mixed anxiety-depressive disorder and participants who malingered the disorder on the MMPI-2.

The first discriminant analysis which included validity scales and the F-K index showed that the Fp and Fb scales are the greatest contributors to differentiating persons with mixed anxiety-depressive disorder, followed by F-K and F (Table 4). The Superlative self-presentation scale (S), the Correction scale (K) and the Variable Response Inconsistency Scale (VRIN) have, as expected, shown a low but significant contribution to group differentiation. The accuracy of participant classification based on their results on these scales is high (Table 6). Finally, of all the validity scales, only the Lie scale (L) and the True Response Inconsistency Scale (TRIN) were not statistically significant in differentiating the malingering group from persons with an actual disorder.

The efficiency of the Fp, Fb and F scales and the F-K index in detecting the malingering of anxiety-depressive disorder is expected and in concordance with earlier research on the efficiency of these scales in revealing malingering [2, 20, 21, 25]. As has been previously mentioned, these are infrequency scales and the F-K index includes results from the F scale. The Fp scale was designed for the purpose of differentiating persons with psychiatric disorders from malingerers, containing items representing serious psychotic symptoms, unusual habits, highly amoral attitudes and identity problems. In view of the fact that the scale is based on items rarely endorsed by the healthy population and those with psychiatric disorders, it is very useful in the detection of malingering and explanation of high results on the F and Fb scales as indices of malingering or a high level of distress and can represent a cry for help. These results support earlier findings on the Fp scale as a very efficient indicator in the detection various malingered psychiatric disorders like

Table 9 Structure matrix (persons with mixed anxiety-depressive disorder and students)

| Variables | Function |
|-----------|----------|
| | 1 |
| LSE | 0.663 |
| SOD | 0.620 |
| TRT | 0.593 |
| Si | 0.552 |
| Pd | 0.548 |
| WRK | 0.547 |
| DEP | 0.503 |
| Pa | 0.456 |
| FAM | 0.437 |
| HEA | 0.437 |
| Pt | 0.432 |
| D | 0.429 |
| ASP | 0.407 |
| ANX | 0.406 |
| BIZ | 0.376 |
| Hs | 0.360 |
| OBS | 0.349 |
| ANG | 0.339 |
| CYN | 0.302 |
| FRS | 0.290 |
| TPA | 0.218 |
| Hy | 0.199 |
| Ma | 0.162 |

schizophrenia or depression [10,21-22]. The obtained results also supported Rogers' [26] findings that the Fp scale was the most significant variable in distinguishing between malingers and psychiatric patients in situations when the malingers were informed of the purpose of validity scales, while the efficiency of other scales decreases when malingers were informed of the validity

scales. In this study, it is obvious that persons with mixed anxiety-depressive disorder achieved average scores on Fp while students as a group had very high results which practically invalidated the profiles (Table 1). The reasons for such results may be in the instructions where the emphasis was laid on symptoms of the disorder, which resulted in their attempt to include as many symptoms as possible, whereby they probably followed their own stereotype of the mental disorder and endorsed rare psychotic symptoms included in the Fp scale, guided by the idea that they would be more convincing with a greater number of symptoms. Other studies also confirm that malingers tend to report more severe and rare symptoms or improbable combinations of symptoms than persons with actual disorders [27]. This tendency among the students in this study is evident through highly elevated results on the F and Fb scales, i.e. on scales where the normative sample rarely responded in the direction in which the scales were scored. On the other hand, persons with mixed anxiety-depressive disorder, as a group, achieved moderately elevated results which do not question the validity of the profile.

A lower contribution of the S scale, the Correction scale (K) and the Variable Response Inconsistency Scale (VRIN) is expected in view of their primary purpose. Namely, the purpose of the S and K scales (together with the L scale) is the detection of a defensive response style and minimization of psychopathology, so it is understandable that their contribution to the detection of malingering is relatively small [11]. These scales have shown their efficiency in studies where the participants were asked to present themselves in a better light and deny the existence of psychological problems [18-28].

Table 10 Group centroids (persons with mixed anxiety-depressive disorder and students)

| Group | Function |
|--------------------|----------|
| | 1 |
| Students | 2.122 |
| Anxiety-depressive | -2.122 |

Since the S scale is intended for the detection of persons who fake good, reducing and denying the frequency of psychological and adaptation problems, it is logical that the contribution of this scale in the differentiation of groups in malingering psychopathology is low. Students have significantly lower results on this scale than persons with mixed anxiety-depressive disorder, which means that they tend to express themselves in negative terms. However, results for persons with mixed anxiety-depressive disorder are relatively low on this scale, which is expected of persons with a diagnosed disorder. The contribution of the K scale as a suppressor scale for detecting a reduction in psychopathology on the MMPI-2 is relatively low as both groups show a tendency toward lower values on this scale. The VRIN is a measure of inconsistency in responses and has a modest contribution to group differentiation. It is interesting

to note that students show less inconsistency in their responses than persons with the actual disorder. This is in accordance with research conducted by Stukenberg, Brady and Klinetob [29] who note that a certain degree of inconsistency is expected in psychotic patients and in persons with nonpsychotic disorders, while those achieving high results on the F scale and low or moderate results on the VRIN scale (this combination was found for the students) can be suspected of over-reporting symptoms. Namely, consistent responding, results in a low or moderate VRIN, are not consistent with describing confusion and psychotic symptoms (evident in high results on the F scale).

The L scale has not shown to be significant in the detection of malingering the mixed anxiety-depressive disorder. The results could also be explained by the fact that it is a measure of a deliberate and rather un-

Table 11 The accuracy of aposterior classification (persons with mixed anxiety-depressive disorder and students)

| | Anxiety-depressive | Students |
|----------------------|--------------------|------------|
| Anxiety - depressive | 43 (91.5%) | 4 (8.5%) |
| Students | 1 (2.1%) | 46 (97.9%) |

sophisticated attempt to present oneself in a favorable light and as exceptionally psychologically adapted [11]. Since the TRIN scale is intended for the detection of inconsistent “true” responses and that both groups achieved moderate results on this scale, it is understandable that it was not statistically significant.

In order to determine whether a difference in basic and content scales on the MMPI-2 exists between persons with actual mixed anxiety-depressive disorder and those malingering mixed anxiety-depressive disorder, a second discriminant analysis was conducted. The discriminant analysis revealed that all basic scales, apart from the Sc scale and all content scales significantly discriminate groups of students from those with the actual disorder. The Sc scale does not contribute to group differentiation, and results of both groups are elevated. Despite the fact that the primary purpose of the scale is to measure symptoms typical of psychotic disorders, it is a very heterogeneous scale which includes content such as overt psychotic behavior, disorganization, disorientation, delusional ideas, hallucinations, bizarre sensory experiences as well as mood problems, lack of interest, emotional alienation, problems with concentration, problems with memory and unusual bodily sensations, so it is no surprise that both groups showed elevated results [11].

An overview of the structure of the discriminant functions (Table 9) shows that content scales have a greater contribution to the differentiation of groups than do basic scales. Even though Sellbom et al. [28] claim that a statistically significant difference in the efficiency of basic and content scales does not exist in the detection of malingering, Graham [30] reports that content scales,

due to their greater face value, are more sensitive than basic scales in detecting malingering. In contrast to empirical strategy used in the construction of clinical scales, content scales consist of homogeneously grouped items which measure one dimension [11]. Table 9 shows that the greatest contribution to differentiating malingerers and persons with actual mixed anxiety-depressive disorder are the LSE, SOD and TRT scales, followed by the basic scales of Social introversion (Si), Psychopathic deviate (Pd) and content scales WRK and DEP. A moderate contribution to group differentiation comes from the Paranoia scale (Pa), content scales FAM and HEA, followed by basic scales Psychastenia (Pt) and Depression (D), content scales ASP, ANX, BIZ, OBS, ANG and CYN and the basic scale Hypochondriasis (Hs). Content scales FRS and TPA and basic scales Hysteria (HY) and Hypomania (Ma) have the lowest contribution to group differentiation.

The LSE scale includes content referring to low self-doubt and negative submissiveness. The group with mixed anxiety-depressive disorder achieved moderately elevated results on this scale, while the students showed greatly elevated values. This is expected in view of the fact that the students were instructed on the symptoms of mixed anxiety-depressive disorder as being feelings of low self-worth, low self-esteem and lack of confidence in their own abilities. A high discriminative power was shown by content scales Social Discomfort (SOD) and Negative Treatment Indicators (TRT). This was not directly indicated in the instructions, but it is obvious that the stereotype held by students on mental disorders includes unease in social relations, a belief that no-one can help and understand them, lack of motivation to change and refusal to discuss prob-

lems, which is content included in these two scales [11]. It is interesting to note that these two scales are only moderately (not on clinical level) elevated for persons with the actual disorder. The basic scale of Social introversion (Si) has also shown to be powerful in differentiating malingerers from those affected, probably because the students overemphasized irritability, low tolerance to frustration, social awkwardness and unease characteristic of the items contained in the scale [5]. It is also interesting to mention that the Psychopathic Deviate Scale (Pd) was significant in differentiating between the groups, in view of the fact that it is a measure of antisocial tendencies, where the total result is closely related to behavior patterns indicative of family problems, conduct disorders, aggressive, manipulative and impulsive reactions [11] which are not typical characteristics of persons suffering from mixed anxiety-depressive disorder. This scale also includes items referring to emptiness and dissatisfaction with life, which probably contributed to the high results achieved by the students and moderately (clinically nonsignificant) elevated results for persons with the actual disorder. The moderate discriminative power of the WRK content scale, which describes difficulties at work is understandable because of the items in this scale, which the students recognized as listing symptoms described in the instructions, including problems with concentration, tension, low self-esteem, concern etc. It could be expected, in view of the fact that it is an anxiety-depressive disorder, that the majority of the ANX and DEP content scales and the basic scales D and Pt, would have a relatively small contribution in the discrimination of groups as they are scales with elevated results for persons with anxiety-depressive disorders [19]. However, these scales proved to

be moderately effective in differentiating between the groups. Once again, it was shown that students indiscriminately responded to items in these scales, not taking into account that persons with this disorder do not have all the symptoms listed in the scales.

The basic scales Hy and Ma have shown the smallest contribution in group differentiation. Despite the fact that the Hy scale is part of the so-called neurotic triad made up of the first three basic MMPI-2 scales (hypochondriasis, depression and hysteria), which are often elevated in anxiety-depressive states, it is possible that characteristics such as denial of aggressive impulses, physical fatigue and lack of social anxiety (measured by the Hy scale) as well as hyperactivity, rapid mood swings, impulsiveness, distractibility and unpredictability (measured by the Ma scale) were not recognized as characteristic of the anxiety-depressive disorder and thus were not overrepresented as symptoms to the extent seen in other scales.

The accuracy in classifying participants on the basis of basic and content scale results is somewhat lower than for validity scales, but is still high.

This study has some limitations. Firstly, the study was conducted on female participants, which prevents generalization to other groups. A sample of males may yield different results. The promised experimental credits if they “fool” the test are also questionable in the degree of motivation. Namely, in real situations where people decide to malingering disorders, the motivation is much stronger, as is the wish to remain undetected.

In conclusion, we can state that validity scales, firstly the Infrequency scales and the F-K index are very efficient in differentiating between malingered and actual mixed anxiety-depressive disorder. The profiles for

students who were instructed to malingering the mixed anxiety-depressive disorder and persons with the actual disorder are significantly different on the basic and content scales, with the content scales LSE, SOD and TRT being the major contributors, together with basic scales Si and Pd.

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Acknowledgements

None

Conflict of interest

None to declare

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Učinkovitost ljestvica valjanosti iz MMPI-2 u detekciji simulacije miješanog anksiozno-depresivnog poremećaja

Sažetak – Cilj ovog istraživanja bio je ispitati učinkovitost ljestvica valjanosti (F, Fb, Fp, F-K, K, L, S, VRIN i TRIN) iz Minnesota multifaktnog inventara ličnosti (MMPI-2) u detekciji simulacije mješovitog anksiozno-depresivnog poremećaja, te mogućnost razlikovanja skupina osoba sa mješovitim anksiozno-depresivnim poremećajem i osoba instruiranih da simuliraju anksiozno-depresivni poremećaj na osnovi profila temeljnih ljestvica i ljestvica sadržaja. Sudionici u istraživanju su 47 bolesnica s dijagnozom mješovitog anksiozno-depresivnog poremećaja i 47 studentica psihologije koje su dobile opis simptoma mješovitog anksiozno-depresivnog poremećaja i informaciju o ljestvicama valjanosti iz MMPI-2. Od studentica je zatraženo da pokušaju simulirati mješoviti anksiozno-depresivni poremećaj i da to nastoje učiniti tako da izbjegnu otkrivanje. Rezultati diskriminacijske analize su pokazali da je ljestvica valjanosti Fp najučinkovitija u otkrivanju simuliranih profila, a potom slijedi ljestvica Fb, indeks F-K, te ljestvica F. Ljestvice S, K i VRIN pokazale su nižu i negativnu povezanost s diskriminacijskom funkcijom što je i očekivano s obzirom na njihovu svrhu (prikazivanje u boljem stanju nego što jest). Točnost klasifikacija na osnovi rezultata na ljestvicama valjanosti vrlo je visoka (97,9% osoba sa anksiozno-depresivnim poremećajem i 97,9% simulantica ispravno su klasificirani). Ljestvice L i TRIN nisu se pokazale značajnima u razlikovanju profila simulanata i osoba sa stvarnim poremećajem. Diskriminacijskom analizom je također provjerena mogućnost razlikovanja profila temeljnih ljestvica i ljestvica sadržaja, pri čemu su se ljestvice sadržaja LSE, SOD i TRT te temeljne ljestvice Si i Pd pokazale najučinkovitijima u razlikovanju profila simulanata i osoba sa anksiozno-depresivnim poremećajem. Točnost klasifikacija profila simulantica i osoba sa anksiozno-depresivnim poremećajem na temelju rezultata na temeljnim ljestvicama i ljestvicama sadržaja također je visoka (91,5% osoba sa anksiozno-depresivnim poremećajem i 97,9% studentica ispravno su klasificirane).

Ključne riječi: simulacija, mješoviti anksiozno-depresivni poremećaj, MMPI-2, ljestvice valjanost, temeljne ljestvice, ljestvice sadržaja

