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Can digit symbol-verbal fluency comparisons facilitate detection of pseudodementia?

A preliminary study

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Abstract Depressive psychomotor retardation may impair performance on timed tests. By comparison word association measures of verbal fluency are reportedly unaffected by depression. Comparisons of a brief psychomotor test with a measure of verbal fluency may therefore prove useful when there is a concern that depression may be undermining adaptive functioning, assuming both measures display: (1) broad- spectrum sensitivity to brain impairment, (2) differential vulnerability to depression, and (3) moderate correlation in nondepressed persons. Digit Symbol (DS) and the "FAS" measure of verbal fluency are sensitive to genuine dementia, satisfying the first criterion. We found that depressed schizophrenics performed at significantly lower levels on DS, but not on FAS, than nondepressed schizophrenics. The two groups differed significantly on a discrepancy score derived by subtracting FAS from DS scores; normals obtained discrepancy scores highly similar to those of nondepressed schizophrenics. As the normals had higher DS and FAS scores, this discrepancy-score similarity suggests that this index may have wide application. The third criterion is satisfied by the findings of a 0.64 correlation between DS and FAS scores adjusted for age (DS and FAS) as well as gender and educational attainment (FAS) in nondepressed samples. Implications for further research and clinical applications are discussed.

Key words Neuropsychology · Pseudodementia
Psychomotor retardation · Verbal fluency · Schizophrenia

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Introduction

The differentiation of depressive pseudodementia from true dementia is a daunting challenge. Although attention has focused on clinical observation (Wells 1979), the development of diagnostic-decision rules based on cognitive profile has also attracted interest (Kendrick 1967). Because depressive psychomotor retardation is common (Lishman 1978), the performance of depressives on timed "performance" tests is a promising domain. Pernicano (1986), for example, reported that depressives exhibited significantly lower Wechsler Adult Intelligence Scale (WAIS-R) performance than verbal intelligence quotients.

One WAIS-R performance scale subtest, Digit Symbol (DS), may be especially suitable for inclusion in brief examinations intended to clarify pseudodementia differential diagnosis issues. It is a quick, easily administered procedure that depends heavily upon visuomotor speed. Although probably vulnerable to depressive retardation, it is also exquisitely sensitive to brain compromise (Lezak 1983). Therefore, to facilitate detection of pseudodementia DS performances must be compared with measures similarly sensitive to brain compromise, but less affected by depression. The finding of Kronfol et al. (1978) that depression severe enough to warrant ECT treatment had little impact on word-association production has found its way into the neuropsychological literature (Lezak 1983; Goodwin 1989), making "FAS"-style verbal fluency tests (so-named because these letters are commonly employed to elicit word associations; Lezak 1983) an attractive candidate.

The development of an "impact of depression upon cognition" index based on FAS and DS comparisons is appealing, because both are timed, brief, and easily administered at bedside. The FAS shares with DS broad-spectrum sensitivity to brain dysfunction (Borkowski et al. 1967). Although frontal pathology is especially likely to impair performance, Alzheimer's Dementia and other diffuse processes have been associated with poor performance (Lezak 1983).

As a step toward establishing the differential sensitivity of these measures to depression we investigated the relationship between DS, FAS, and depression in a sample of schizophrenics and nondepressed normals. Schizophrenics are commonly depressed (Johnson 1981), and failure to recognize this may result in the misattribution of reversible cognitive deficits to essentially non-reversible negative symptom states.

Subjects and methods

Schizophrenic subjects were drawn from a sample of 46 diagnosed by Schedule for Affective Disorders and Schizophrenia (SADS) interviews. The average age was 42.8 years (SD 10.79 years), 34.8% were male and 65.2% female, and the mean for the number of years of education was 11.8 years (SD 2.0). Of the 46 subjects, 44 were outpatients and two were inpatients. Normal subjects were drawn from 26 employees recruited as controls (average age 38.7 years; SD 10.91 years; 30.8% male and 69.2% female; mean number of years of education 13.4 years; SD 1.4 years). Candidates with neurological disease and significant substance-abuse histories were excluded, along with subjects unable to complete measures due to either illiteracy or psychotic agitation. English was the first language of all subjects.

The WAIS-RDS subtest and FAS were administered in a brief neuropsychological battery. The FAS was administered as follows: Subjects were told the examiner was going to say a letter of the alphabet, after which they were to say as many words beginning with that letter as they could. They were instructed not to use people or the names of places, or use a word more than once by adding suffices onto the end (e.g. run, runs, runner, etc). A brief practice trial was administered to ensure proper set. Three 1-min trials ("f", "a", and "s") were then conducted.

The Gates-MacGinitie Reading Vocabulary Test Level 7–9 Form K (MacGinitie and MacGinitie 1989) was administered as a measure of educational attainment. Depression was assessed with the 13-item subscale of the Symptom Checklist List 90 (SCL-90-R; Derogatis 1983). Raw scores were adjusted to accommodate the sensitivity of these measures to age (DS and FAS; Lezak 1983; Wechsler 1981) gender, and education (FAS; Lezak 1983). The DS scores were adjusted for age by multiplying each subject's raw score by the median raw score (61) for a scaled score of 10 for age group 20–24 years, divided by the median raw score required to obtain a scaled score of 10 for the individual's age group (Wechsler 1981). The raw score of a 50-year-old subject, for example, would be mulitplied by 61/49.5. This was considered preferable to using age-scaled scores, as the conversion results in a considerable reduction in variability (i.e., to a few scaled-score points). The FAS performances were corrected using adjustments for age, gender, and education (Lezak 1983), but with a modification: Rather than adjust on the basis of claimed years of completed schooling, we substituted grade equivalents derived from Gates-MacGinitie Reading Vocabulary, level 7–9, form K, scores (MacGinitie and MacGinitie, 1989), a more precise measure of attainment (Hawkins et al. 1993). Because of the low ceiling of the G-MRVT form used, we employed the adjustments published by Lezak when adjusting the scores of five subjects (two schizophrenic and three controls) with 4 years of college education.

Results

Depression in the schizophrenic sample

The mean total SCL-90-R depression subscale raw score for the schizophrenic sample (n = 46) was 10.02 (8.35). Because the possible range (higher scores = greater severity) is 0–52, it was evident that although a reasonable range existed (0–34), the depressive symptomatology was mild on average. To test the relationship between depression and cognition two groups of extreme scorers were formed, each consisting of 11 members. The mean depression scores for the low and high schizophrenic groups were 1.0 (1.0) and 21.8 (5.6), respectively. Although the mean score for the depressed group approximately equals a T score of 48 (females) or 51 (males) relative to outpatient norms (Derogatis 1983), relative to non patients norms it is equivalent to T 68 (females) and 76 (males), indicating that on average these patients reported greater depressive symptomatology than 95% of normals.

Comparison of DS and FAS means between schizophrenic groups

The high (3 males and 8 females) and low (4 males and 7 females) depression groups did not differ in age (mean for non-depressed 44.2 years and for depressed 41.3 years; t (20) = 0.7; P = 0.49) or reading vocabulary (mean for nondepressed 28.5 and for depressed 25.5; t (20) = 0.59; P = 0.57). The adjusted DS means of the low and high depression groups, 48.1 (16.8) and 34.6 (11.0), respectively, differed significantly in the expected direction: t (20) = 2.23 and P = 0.04. The groups did not differ significantly on the FAS: 31.9 (10.4) and 34.9 (13.1), respectively, with t (20) = –0.60 and P = 0.56.

Derivation of a depression-prediction cutting score

Because DS and FAS performances were differentially related to depression in these groups, a new variable was formed by subtracing the FAS score from the DS score to allow for the derivation of a group membership-predicting cutting score. The group means on this discrepancy score (DS minus FAS), 16.2 (14.9) and –0.281 (17.5) for the nondepressed and depressed groups, respectively, differed significantly: one-tailed t (20) = 2.38 and $P < 0.05$.

A cutting score with reasonable capacity to accurately indentify group members was derived from direct observation of discrepancy-score tables for each group. Discrepancy scores greater than 6 correctly identified 82% of the nondepressed group (9 of 11), and scores lower than 6 correctly identified 64% of the depressed group (7 of 11).

Partial validation in the nondepressed control group

The control subjects reported low levels of depression, making it possible to form a nondepressed control group of 18 subjects (5 males and 13 females; mean age 36.8 years; SD 11.5 years) with SCL-90-R raw scores of 4 or less (to equate to the mean and SD of the nondepressed schizophrenic groups). Both nondepressed groups displayed mean levels of depression approximately equal to nonpatient T scores of 41 (females) and 45 (males).

This nondepressed normal group exhibited discrepancy scores derived from adjusted DS and FAS scores that were highly similar to those obtained by the nondepressed schizophrenic group: 17.7 (11.1) and 16.2 (14.9), respectively, with t (27) = -0.31 and P = 0.76, despite obvious differences in psychiatric status, reading vocabulary (G-MRVT grade equivalent means 12.1 and 8.6; t (27) = –3.06; P = 0.005), mean raw DS (57.7 and 41.6, t = (27) = –3.41; P = 0.002), and mean raw FAS scores (43.3 and 26.6; t = –3.84 (27); P = 0.001). The cutting score of 6 considered optimal for the schizophrenic groups correctly identified 89% of this group as nondepressed (16 of 18). Moreover, the baseline relationship of FAS to DS appears to be of reasonable magnitude. In a sample made up of the combined nondepressed schizophrenic and control groups (n = 29), adjusted DS correlated 0.64 (P < 0.001) with adjusted FAS.

Conclusions

Our findings confirm that the FAS is less vulnerable to depression than DS. Discrepancy scores generated by subtracting FAS from DS scores differed significantly between nondepressed and depressed schizophrenic groups, whereas discrepancy scores derived the same way for nondepressed normals were highly similar to those of nondepressed schizophrenics. Because both DS and FAS are brief tasks that can be easily used bedside, their conjoint use may aid differential diagnosis when there is concern that depression is complicating the assessment of "true" adaptive status.

Although the dichotomy between pseudodementia of depression and dementia is frequently inadequate (due to a high degree of comorbidity in numerous permutations; Wells 1979), it serves as a useful rubric for clinical situations where the interplay of congitive and mood factors clouds diagnosis and complicates treatment or discharge planning. An empirically validated index of the impact of depresssion on cognition, such as that proposed here, would be useful in circumstances when: (1) uncertainty exists as to whether cognitive functioning *is* impaired by known depression; (2) uncertainty exists over the relative contributions to adaptive deficits of depression and dementia in patients strongly suspected of suffering both; and (3) a patient denies depression, yet displays adaptive deficits for which depression is suspected to be responsible. In the first and second cases the lower DS minus FAS score, the more likely it is that aspects of cognition and adaptive functioning are impaired secondary to depression, assuming future validation of the significance of DS/FAS discrepancy as postulated. In the third case, a low discrepancy score may reinforce suspicions that the patient is depressed.

Cross validation of the differential sensitivity of these measures to depression in diverse samples, including dementia and affective-disorder groups, is obviously highly desirable and will facilitate the generation of useful DS minus FAS cutting scores. To definitively validate DS/FAS discrepancy as an index of the effects of depression on cognition it is necessary to employ designs utilizing repeated cognitive measures over different mood states. Additionally, clinicians should note that the usefulness of any index of this nature is subject to logical constraints. In circumstances other than global impairment the potential of DS/FAS comparisons to aid differential diagnosis is limited, e.g., in focal CNS compromise accompanied by depression. DS and FAS performances may be affected differently depending on the location, acuteness, extent, and type of insult. Patients with dysphasia consitute an obvious class for whom such comparisons are of questionable value.

Although any single index will ultimately be of limited utility due to the intrinsic complexities of this diagnostic domain, further research into the validity of DS/FAS comparisons is worth pursuing. Judgments regarding the effects of mood on cognitive and adaptive functioning significantly influence treatment, patient management, monitoring, and discharge planning, yet are currently made with minimal guidance from empirical aids. The adequacy of these judgments will in all probability be improved by the application of empirically derived red flags of even modest validity.

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References

Borkowski JG, Benton AL, Spreen O (1967) Word fluency and brain damage. Neuropsychologia 5:135–140

Derogatis LR (1983) SCL-90-R administration, scoring, and procedures manual II for the revised version. Clinical Psychometric Research, Towson, Md

Goodwin DM (1989) A dictionary of neuropsychology. Springer, Berlin Heidelberg New York

Hawkins KA, Sledge WH, Orleans JF, Quinlan DM, Rakfeldt J, Hoffman RE (1993) Normative implications of the relationship between reading vocabulary and Boston Naming Test performance. Arch Clin Neuropsychol 8:525–537

Johnson DAW (1981) Studies of depressive symptoms in schizophrenia. Br J Psychiatry 139:89–101

Kendrick DC (1967) A cross-validation study of the use of the SLT and DCT in screening for diffuse brain pathology in elderly subjects. Br J Med Psychol 40:173–178

Kronfol Z, deS Hamsher K, Digre K, Waziri R (1978) Depression and hemispheric functions: changes associated with unilateral ECT. Br J Psychiatry 132:560–567

Lezak MD (1983) Neuropsychological assessment, 2nd edn. Oxford University Press, New York

Lishman WA (1978) Organic Psychiatry. Blackwell Scientific Publications, Oxford.

MacGinitie WH, MacGinitie RK (1989) Gates-MacGinitie Reading Tests: manual for scoring and interpretation, levels 7/9 and 10/12, forms K and L, 3rd edn. Riverside, Chicago, Il.

Pernicano KM (1986) Score differences in WAIS-R scatter for schizophrenics, depressives, and personality disorders. Psychol Rep 59:539–543

Wechsler D (1981) WAIS-R Manual. The Psychological Corporation, Cleveland, Ohio

Wells CE (1979) Pseudodomentia. Am J Psychiatry 136:895–900