THE UTILITY OF THE D2 TEST OF ATTENTION AS A MALINGERING INDICATOR

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BACKGROUND

- Numerous indices have been proposed to detect effort and malingering using standard neuropsychological tests. Research has found that some traditional tests are useful to this purpose, despite the fact that specific malingering tests obtain better sensitivity (???) levels.
- In the last 15 years, increasing research has been conducted in the field of forensic neuropsychogy in North-American populations. Nevertheless, this interest has been not been matched in Europe. Malingering detection is a pending subject in countries like Spain, where the demand of forensic neuropsychological evaluations is increasing rapidly.
- Just three articles have studies specific malingering tests using Spanish samples (Ramírez, Chirivella-Garrido, Caballero, Ferri-Campos, & Noé-Sebastián, 2004; Vilar-López et al., 2007; Vilar-López, Gómez-Río, Caracuel-Romero, Llamas-Elvira, & Pérez-García, In Press) but not have focused on using standardized neuropsychological tests.
-The aim of this study was to prove the utility of the d2 test of attention as a means of detecting malingering in a Spanish population.

METHODS

- Fifty-four patients with Mild Traumatic Brain Injury (MTBI) were divided as follows: Thirty non compensation-seeking patients, with a median age of 32,50 years (Sd=13,67) and a median of 9,30 years of schooling (Sd=3,45); fourteen compensation-seeking patients not suspected of malingering, with a median age of 35,92 years (Sd=10,88) and a median of 9,14 years of schooling (Sd=3,50); and 10 individuals suspected of malingering. Individuals were considered suspect when they obtained two or more measures indicative of malingering in specific malingering tests (Victoria Symptom Validity Test, Test of Memory Malingering, b test, Dot Counting Test or Rey 15-Item Test). Finally, in this study, thirty 4th year Psychology students (in a five year program) who were knowledgeable about neuropsychology made up the group of analogues (AN). The mean age of the group was 20.92 years (Sd= 3.08), and the mean education level was 13.92 years (Sd= 2.35). None of these participants reported a history of brain injury.
- All of the subjects underwent an extensive neuropsychological assessment by a trained technician. The evaluation included the d2 test. Volunteers were tested at the “Hospital Ruiz de Alda” (Granada, Spain).
- The selected variables in this study were: the selective and sustained attention measure TR; the processing accuracy measure TA; number of commission errors C; the attentional and inhibitory control measure TOT; the concentration measure CON; and the consistency in the task measure VAR.

Table 1. Descriptive statistics and comparisons between groups

Variable	NCS group	NSM group	SM group	AN group	U	*p*	Mann-Whitney
	Mean (Sd)	Mean (Sd)	Mean (Sd)	Mean (Sd)			
TR	380,78 (77,89)	354,38 (74,06)	258,10 (118,16)	336,18 (101,14)	9,40	0,024	NCS=NSM=AN; NCS>SM; NSM>SM; SM<AN
TA	140,53 (35,00)	135,38 (31,37)	76,40 (34,57)	111,00 (34,88)	20,52	0,000	(NCS=NSM)>SM; NCS=AN; NSM>AN; SM<AN
C errors	4,32 (11,54)	1,15 (2,11)	10,40 (21,62)	22,48 (47,14)	15,61	0,001	(SM=AN)>NSM; NCS=NSM; NCS=SM; NCS=AN
TOT	357,92 (81,52)	340,00 (73,90)	215,60 (94,63)	282,85 (84,41)	18,78	0,000	(NCS=NSM)>SM; NCS=AN; NSM>AN; SM<AN
CON	139,50 (37,98)	133,07 (32,00)	63,30 (42,54)	88,14 (51,77)	26,76	0,000	(NCS=NSM)>SM; NCS=AN; NSM>AN; SM=AN
VAR	13,89 (4,59)	14,61 (8,36)	16,30 (8,42)	14,25 (5,08)	0,70	0,873	NCS=NSM=SM=AN

RESULTS

- Differences between groups were tested by using 6 non-parametric analyses for 4 independent groups (Kruskal-Wallis statistic). In all cases, the independent variable (IV) was the group composition [non-compensation seeking group (NCS) vs. compensation-seeking group not suspected of malingering (NSM) vs. compensation seeking group suspected of malingering (SM) vs. group of analogues (AN)]. The dependent variables (DV) were TR, TA, C, TOT, CON and VAR.
- Statistical significant differences among the groups were found in all the variables except VAR. TR [$\chi 2(2)= 9,40$; $p<0,024$], TA [$\chi 2(2)= 20,52$; $p<0,000$], C [$\chi 2(2)= 15,61$; $p<0,001$], TOT [$\chi 2(2)= 18,78$; $p<0,000$], CON [$\chi 2(2)= 26,76$; $p<0,000$].
- Cutt-off points with their sensitivity were calculated for those variables in which statistical differences were found, taking a specificity of at least 90% as a criterion. In order to found the cut-off points to distinguish patients with MTBI (both compensation and non-compensation seeking) and suspected malingerers, 5 ROC curve analyses were conducted. Positive predictive power (PPP) and negative predictive power (NPP) were calculated taken into account a 30% base rate of malingering.

Table 2. Sensitivity, specificity, ROC area, PPP and NPP for the selected variables

Variable	Cutt off	Sensitivity	CI 95%	Specificity	CI 95%	ROC area	PPP	NPP
TR	<=283	70,0	34,8-93,0	90,2	76,9-97,2	0,776	75.5	87.5
TA	<=82	60,0	26,4-87,6	95,1	83,4-99,3	0,894	84.1	84.7
Errores c	> 5	30,0	7,0-65,2	90,2	76,9-97,2	0,710	72.5	74.9
TOT	<=248	70,0	34,8 - 93,0	90,2	76,9 - 97,2	0,856	75.5	87.5
CON	<=78	70,0	34,8 - 93,0	92,7	80,1 - 98,4	0,910	80.4	87.8

CONCLUSIONS

- Some variables of the d2 test have shown promise as malingering indicators. TR, TOT and CON could classify correctly more that 90% of the patients and 70% of the suspected malingerers.

-- Surprisingly, the only variable proposed in the manual as a possible indicator of the motivation of the patient (VAR) should not be used as a valid indicator of malingering according on present data.

- More research is needed to establish the usefulness of this test as a malingering indicator, given the low n included in this study.