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Detecting faking good in military enlistment procedure according to a new index for the MMPI-2

La rilevazione della Dissimulazione nelle procedure di arruolamento e selezione militari: un nuovo indice del test MMPI 2

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Abstract
In forensic contexts, reverse malingering and faking good are no rare observations. Continuing a previous study in which the authors had drawn up an index to detect faking good in forensic contexts (FEDI), based on the MMPI-2 scales, the present work proposes an index to be used in military enlistment procedures, which has been denominated as the Military Enlistment Dissimulation Index (MEDI). The work describes two consecutive studies: in the first study a group of candidates for military enlistment was selected in order to discriminate the MMPI-2 variables at the highest risk of faking and thereby build the MEDI index. In the second study the MEDI index was validated on two different cohorts of candidates for enlistment, applying the Receiver Operating Characteristic (ROC) Curve for comparisons with a control group. The performance of MEDI in discriminating enlistment candidates from the volunteer respondents resulted satisfactory in terms of diagnostic accuracy (Cohort 1: Area Under Curve = .79, Standard Error = .03, Sensibility = .85, Specificity = .78; Cohort 2: Area Under Curve = .79, Standard Error = .03, Sensibility = .82, Specificity = .70).

Key words: Forensic science • MMPI-2 • Dissimulation Index • Faking good • Military Enlistment • Diagnostic Accuracy

Riassunto
In contesti forensi, il malingering inverso e la dissimulazione non sono osservazioni rare. In continuità con uno studio precedente in cui gli autori avevano elaborato un indice per rilevare la dissimulazione in contesti forensi (FEDI), basato sulle scale MMPI-2, il presente lavoro propone un indice da utilizzare nelle procedure di arruolamento militare, che è stato denominato come indice di dissimulazione dell'arruolamento militare (MEDI). Il lavoro descrive due studi consecutivi: nel primo studio è stato selezionato un gruppo di candidati per l'arruolamento militare al fine di discriminare le variabili MMPI-2 con il più alto rischio di falsificazione e quindi costruire l'indice MEDI. Nel secondo studio l'indice MEDI è stato validato su due diverse coorti di candidati per l'arruolamento, applicando le Curve ROC per i confronti con un gruppo di controllo. Le prestazioni di MEDI nel discriminare i candidati all'arruolamento dagli altri intervistati volontari sono risultate soddisfacenti in termini di accuratezza diagnostica (Coorte 1: Area Under Curve = .79, Errore standard = .03, Sensibilità = .85, Specificità = .78; Coorte 2: Area Sotto Curva = .79, Errore standard = .03, Sensibilità = .82, Specificità = .70).

Parole chiave: Scienze Forensi, MMPI-2, Indice di dissimulazione, Dissimulazione, Arruolamento, Selzione Militare, Accuratezza Diagnostica

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Introduction

In some circumstances, people can behave with the aim to hide or voluntarily ignore the presence of a known disease or undesirable aspects of personality, pretending it does not exist and acting to prevent it from being ascertained (Steffan & Morgan, 2008; Catanesi, Martino, Scapati, & Varia, 2007; Puccini, 1995, Montrone et al, 2016). These attitudes are referred to as reverse malingering and faking good, respectively, and represents the opposite of malingering, which is defined as the voluntary fabrication or exaggeration of mental or physical symptoms to gain secondary benefits (Monaro et al, 2018). For being considered the opposite of malingering, in the form of reverse malingering or faking good, the behavior must be deliberate, consciously aimed to feign that respondent is unaffected by a psychopathological disorder, in order to gain some advantages.

There are several reasons for faking good a syndrome, for the purposes of:

- Obtaining different certificates or licenses (e.g. license to carry a firearm, a driving license, a sexual reorientation certificate, or permission to return to work, to continue to exert parental authority, or to be certified as eligible for the entrustment or adoption of a minor);
- Obtaining or keeping a job, for career advancement;
- Stipulating insurance policies at more advantageous conditions;
- Cheating medico-legal assessments for health insurance policies, or to evade interdiction orders, certificates preventing employment in a particular field or, vice versa, to make a claim for special care.

Faking good is an attitude that may invalidate the diagnostic process and, for this reason, it constitutes a relevant issue in forensic and military enlistment processes, in which the assessment of the subject is often made to decide whether to grant some form of desired advantage. Notwithstanding its relevance, faking good has been less studied by the scientific community, if compared with malingering probably because it is more difficult to identify, being a more subtle strategy adopted to distort reality. Zickar and Robie (1999) found that faking can dramatically alter the rank ordering of applicants and can decrease mean validities. However, it is necessary to distinguish response distortions occurring when one makes a motivated effort to distort responses, corresponding to the faking attitude, from self-deception, which is a different behavior, with potentially the same effect, which corresponds to the attitude of those individuals who believe they are honestly responding even though their responses do not match real personality features.

From literature analysis emerges that the Minnesota Multiphasic Personality Inventory-2 is the psychodiagnostic tool most commonly used in forensic assessments and selection processes, and includes various indexes aimed at identifying faking good behavior (Steffan & Morgan, 2008; Bachiocchi & Bagby, 2006; Ferracuti, 1999; Fornari & Coda, 2001; Armezzani, 1995; Bond & De Paulo, 2006; Bruno, 2006; Steffan, Morgan, Lee, & Sellbom, 2010; Storm & Graham, 2000; Sellbom, Toomey, Wygant, Kucharski, & Duncan, 2010; Austin, 1992; Bagby, Nicholson, & Buis, 1998; Berry et al., 2001; Berry, Baer, & Harris, 1991; Borum & Grisso, 1995; Dannenbaum & Lanyon, 1993; Di Donato et al., 2010; Gough, 1954; Heilbrun, 1992; Lees-Haley, English, & Glenn, 1991; Lees-Haley, Smith, Williams, & Dunn, 1996; Milton, 2000; Nelson, Hoelzle, Sweet, Arbisi, & Demakis, 2010; Toomey, Kucharski, & Duncan, 2009; Wiener, 1948). However, there is an increasing need for updated indexes specific for different settings. Moreover, being the MMPI-2 widely used since a long time, many items as well as some indexes are well known by the assessment subjects and this contributes to undermine their efficacy. So, new, specific and unknown indexes are needed. In fact, in several studies the effectiveness of social desirability scales as a measure of faking good has been questioned (Dwight & Alliger, 1997; Kroger & Turnbull, 1975; Kriedt & Dawson, 1961): although social desirability scales are designed to detect faking, they are themselves susceptible to be faked. To avoid this problem, in a previous study (Martino et al., 2016), new indexes based on the MMPI-2 scale were devised. The main aim of the work was to verify whether combinations of different scales could adequately discriminate the performance of an experimental group (undergoing forensic assessment to obtain a driving license, a license to carry firearms or to adopt a child) from that of a control group. The results of this first study were used to draw up, a new faking good index (FEDI), able to provide the assessor with indications about the likelihood of faking more reliable than the indexes currently employed in the MMPI-2. The Forensic Evaluation Dissimulation Index (FEDI), (Martino et al., 2016) applied to the MMPI-2, showed to be effective in discriminating people involved in a forensic evaluation from volunteer respondents, not involved in a legal assessment setting. In a further validation phase, authors tried to verify the FEDI effectiveness in a different field, that is the military enlistment procedure, but it was found to be less effective, enlightening again the need for specific tools, appropriate for different assessment procedure which may demand the manipulation of different scales (Austin, 1992; Di Donato et al., 2010; Rothke et al., 1994).

In the military setting, the phenomenon of "reverse malingering" has become more evident since the Second World War (Hulett, 1941; Hunt & Older, 1943). More common behaviors consisted in deliberately withholding information about medical conditions (cerebral injury, diabetes, epilepsy, somnambulism, ophthalmic problems) (Killinger & Zubin, 1946; Markovits, 1993) to avoid suspension from military service or rejection at enlistment assessments, to be approved for special assignments (Special Forces, Aviation), and to prevent their bill of health from being stamped with a psychiatric diagnosis (Budd & Harvey, 2006, Lollis, Marsh, Sowin & Thompson, 2009).

Studies conducted in this field (Galić, Jerneić, & Kovačić, 2012) suggest that real selection situation is somewhere between honest responding and 'fake job' situations in regard to response distortion: in general, applicants are not completely honest but do not distort their personality scores to the maximum possible extent either. Honest respondents describe themselves on a set of items, while respondents in the fake job condition describe an ideal candidate based on their stereotypes about the target job. At the same time, applicants completing personality questionnaires within selection context describe themselves, but exaggerate their positive personality characteristics, and deemphasize negative attributes.

A considerable proportion of faking variance might be due to differences in candidates' motivation to fake (Goffin & Boyd, 2009; Marcus, 2009; McFarland & Ryan, 2000; Snell, Sydell, & Lueke, 1999). Several recent laboratory studies (Jansen, König, Kleinmann, & Melchers, 2012; McFarland & Ryan, 2006; Mueller-Hanson, Heggestad, & Thornton, 2006) measured this motivational component and showed that individual differences in the motivation to fake are related to the extent of faking. Similarly, in a study in which real applicants completed a personality test for research purposes, authors (O'Neill, Goffin, & Gellatly, 2010) found a positive correlation between impression management, measured as a general trait and the motivation to fake.

In a study about faking among military conscripts (Boss, König & Melchers, 2015), authors found that motivational differences between test takers do matter and also that faking increases the correlations between personality dimensions, suggesting that higher correlations can be used as an additional indicator of faking.

In different studies about the predictive validity of Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF) (Ben Porath & Tellegen, 2011) scores in police officer screenings, Tarescavage et coll. (Tarascavage et al., 2015; Tarascavage, Corey & Ben-Porath, 2016; Tarascavage, Brewster, Corey & Ben-Porath, 2015), showed that underreporting is common in this setting, given the incentive to obtain employment by appearing well-adjusted and mentally healthy (Carpenter & Raza, 1987; Hiatt & Hargrave, 1988). In these studies, authors demonstrated the utility of lower cutoffs in this type of evaluation setting, because hired police officers tend to produce scores significantly lower than those found in the general population. About MMPI-2-RF, Roma et al (2018) reported that time conditions could be applied to selection contexts in which self-reports are often used to identify falsifying subjects.

Although the MMPI-2 demonstrated to be a useful tool for identifying faking good attitude, studies in this field always contend with the problem of external validity (Schretlen & Arkowitz, 1990). More targeted studies are needed to verify the performance of the MMPI-2 validity markers in real life contexts. With regard to internal validity, instead, the main problem is to understand whether the subjects identified as good-fakers are really faking or not.

To improve the internal validity, role simulation, random assignment and experimental manipulations are adopted (Rogers, 2008; Schretlen, 1988). In a study conducted in 1995, Viglione et coll. (Viglione, Fals-Stewart & Moxham, 1995) endeavored to maximize the internal and external validity of their research by recruiting subjects who were really motivated to attempt faking in a real life context, rather than having been coached to do so, in a context that induced them to invent or exaggerate symptoms: their patients (hospitalized or not) were US Navy personnel in a small military hospital with a psychiatric unit.

Another problem to be faced in this type of studies, especially as regards reverse malingering, is the question of prevalence. Many authors have underlined the importance of applying more rigorous diagnostic procedures in test validation, such as base rates, to identify the predictive values of the various cut-offs, in different settings (Elwood, 1993; Lollis et al., 2009). Many studies about malingering have been conducted to identify the prevalence of the phenomenon in different settings: according to Sivec et coll. (Sivec, Hilsenroth & Lynn, 1995), the prevalence of simulation in a non-forensic setting is 7.4%. Rogers (2008) estimated the prevalence of malingering in the forensic setting at about 15.7%. In an article published in 2002, based on the assessment of 33,531 cases in the forensic setting, Mittenberg et coll. (Mittenberg, Patton, Canyock & Condit, 2002), found that symptoms were faked or exaggerated in 29% of cases of personal wounds, 30% of cases of disability, 19% of criminal cases and 8% of medical cases. By contrast, despite the spread of reverse malingering and faking good in the forensic and military settings, no studies on the prevalence of the phenomenon seem to have been conducted.

In the present study, focusing on faking good in selection contexts, an index for use in the military setting was devised, named the Military Enlistment Dissimulation Index (MEDI). As will be further demonstrate and discussed, it has shown to be effective in discriminating candidates attempting to enlist in the army from volunteer respondents. It must be noticed that the aim of the study was individuating an evaluation supplement to help the psychologist to assess protocol validity, rather than to infer future officer's behavior (Tarescavage et al., 2015).

Materials and Methods

The study sample included 252 participants who were administered the MMPI-2 test during selection procedures for enlistment in permanent service in the Italian Army

(hereafter denominated MEC). The outcomes of our study had research purposes and did not affected the selection of candidates.

The MMPI-2 test was also administered to a control group consisting of 148 volunteers not involved in any type of selection procedure, attending University courses for a bachelor degree in various disciplines, and staff employed at the University of Bari (hereafter indicated as CTR). Although Tarescavage et coll. (2015) suggest to consider the characteristics of a sample (whether it be normative, mental health outpatients, mental health inpatients, etc.) relative to the population with which one is practicing, unfortunately updated normative data specific for the enlistment are unavailable for Italian context and for MMPI-2.

For the control group participants the following selection criteria were applied:

a) no previous psychiatric/neurological treatment or use of psychodrugs;
b) no secondary interest or advantage in undergoing the test.

All participants were male. Administration of the tests was done in accordance with the ethical principles in the Declaration of Helsinki for clinical research on human samples, and all participants gave written informed consent to take part in the study.

The MMPI-2 test is composed of 567 statements with a True/False response, whose scoring provides 6 validity scales, 10 basic scales (clinical), 15 content scales, and 15 supplementary scales (Butcher & Williams, 1992; Hathaway & McKinley, 1989; Butcher, Dahlstrom, Graham, Tallagen, & Kaemmer, 1989; Butcher, 1990; Butcher, Graham, Williams & Ben-Porath, 1989; Pope, Butcher & Seelen, 2000). This work also took into consideration the "F minus K" Index (Dissimulation Index) developed by Gough (1947), considered by many authors to be a reliable tool (Bond & De Paulo, 2006, Berry et al., 1991; Di Donato et al., 2010; Schretlen & Arkowitz, 1990; Lally, 2003; Butcher & Han, 1995; Gough, 1947; Graham, Watts & Timbrook, 1991; Bannatyne, Gacono & Greene, 1999; Blanchard, McGrath, Pogge & Khadivi, 2003; DuAlba & Scott, 1993; Gough, 1950); and the Superlative Scale (Butcher & Han, 1995), composed by 50 items aimed to explore the person's tendency to make superlative reports of self-attributes.

For the MEC group, the data were obtained from the protocols of the candidates who were administered the MMPI-2 test, in accordance with the procedures provided for by the Army General Staff. In the control group each participant was administered the MMPI-2 in a room devoid of distracting elements, where a test administrator was present to provide necessary clarifications, or to answer any questions about how to fill out the questionnaire.

The work includes two studies, reported in succession for the sake of clarity.

Study 1

As a preliminary, to identify from among the basic scales and content scales any that might be more at risk of distortion by faking in military enlistment procedures, a subgroup of "faking informants" was selected from a sample of 252 MEC candidates, and it was employed only in this preliminary study phase. This subgroup included subjects who had shown quite high social aspirations and faking indexes at the MMPI-2 test, in other words a score of 75 T points at the Lie scale and an F-K index -15. It was not considered necessary to use the K scale as well, as suggested by Wutzler et coll. (Wutzler et al., 2009), because the K scale is already present in the F-K index. The Lie scale, instead, is an index pointing to a superlative manipulation of the self-image during a selection procedure, and is independent of the other control scales (Butcher & Williams, 1992; Hathaway & McKinley, 1989; Butcher et al., 1989; Butcher, 1990; Butcher et al., 1989; Pope et al., 2000).

In this way, a group of 40 participants who had both criteria (Lie 75 T points AND F-K index -15) was extracted from the MEC group. A matched group of 40 participants in the volunteer respondents group, also excluded from the control group for the later validation test (148 participants), was then selected. Preliminarily, it was necessary to decide whether to compare the group of 40 informants and the group of genuine respondents on the scales transformed into T with or without the K correction usually provided for the MMPI-2 test used in the present study. The K correction constitutes - for the basic scales that provide it - the standard form of the MMPI-2 scores. It would therefore be desirable to make available an index in the evaluation of the faking good that adopts the scores typically available in clinical and forensic practice. It is however true that K correction could increase the differences between informants in selection and genuine respondents. Therefore, in a preliminary way, the base scales were compared in their two formats, with and without K correction. First, scales with and without correction were very highly correlated (Pearson's correlations ranged from 0.84 for PT and HS and 0.97 for MA, both with $p < .001$), it was then expected that there were no substantial differences between scales with and without K correction. Nonetheless, two series of five independent samples t tests were performed on scales with and without K correction, comparing the 40 informants and the 40 genuine respondents. In all the five cases considered, the effect of introducing the K correction on scores consisted in reducing rather than increasing the difference between informants and genuine respondents. The introduction of K correction substantially reduced the values of statistics (i.e. t values for raw scores from 10.79 for PT to 6.42 for MA; t values for K corrected scores from 5.98 for PT to 3.42 for PD), thus reducing (without eliminating) the differences between the two groups that were exaggerated towards the raw scores. The K corrected scores are therefore more "conservative" and "fair" than the raw scores and therefore the K corrected scales were used in the present study for the basic scales which provide for such

correction. The T points adjusted for K were compared for the resulting preliminary test groups, to see if there were MMPI-2 scales that demonstrated more marked differences, and if so which. This process made it possible to isolate, in the military enlistment sample more prone to attempt faking, the scales used to build the MEDI – Military Enlistment Dissimulation Index.

Statistics

Firstly, comparison was made between the basic scales and content scales in the two partial groups, MEC and CTR, by analysis of variance (ANOVA) and observation of the effect size (Partial Eta Squared) to identify those scales showing a greater difference between the group of military candidates and the volunteer respondents. Owing to differences in means attributable to age and years of education in the two groups, an analysis of covariance (ANCOVA) was also made to purge the effects of any undesired influence by uncontrolled demographic variables.

Secondly, the MEDI scale was extracted and calculated (along with reduced versions or partial indexes), and its use was tested for enlistment assessment purposes using ROC Curve statistics. The ROC curves allow the diagnostic accuracy of a test to be evaluated (estimated on the area under the curve and the related 95% confidence interval); the best cutoff (that minimizes inaccurate diagnoses), and associated sensitivity (Se: the rate of true positives), specificity (Sp: the rate of true negatives), and likelihood ratios for positive and negative diagnoses (LR+, LR- i.e., Se/(1–Sp) and (1–Se)/Sp, respectively). The general idea is that the first type of analysis can potentially detect differences between groups according to their scale means. However, these preliminary analyses do not provide any clear guidance as to the diagnostic power of scales. The second type of statistical analysis is instead able to clearly evaluate the diagnostic ability of an index, providing a better understanding of its practical value.

Results

The preliminary analysis conducted with the 40 participants in the MEC subgroup and the 40 participants in the CTR subgroup showed significant differences in age and years of education. Table 1 shows the descriptive statistics for the demographic and selection variables in the two subgroups. Table 2 shows F ratio, significance level and partial eta-squared for the adjusted and unadjusted model by covariates (age and years of education) for each MMPI-2 Scale considered and comparing candidates for military enlistment with the control group participants.

		N	Mean	SD	F (1,78)	p	Etap2
AGE (yy)	CTR	40	23.47	3.21	12.94	< .001	0.16
	MEC	40	26.10	2.85			
EDU (yy)	CTR	40	15.67	2.49	73.78	< .001	0.49
	MEC	40	10.87	2.50			
F-K (Raw Scores)	CTR	40	-3.70	9.41	130.04	< .001	0.62
	MEC	40	-20.40	2.49			
LIE (T Scores)	CTR	40	53.77	8.33	264.10	< .001	0.77
	MEC	40	79.55	3.25			

Table 1
Sample size, mean and standard deviation by age, years of education, F-K index and Lie scale for the two subgroups of Military Enlistment Candidates (MEC) and control respondents (CTR).

	Adjusted model			Unadjusted model		
MMPI Scale (T scores)	F	Sig.	Etap2	F	Sig.	Etap2
HS	4.164	<0.01	0.141	2.155	n.s.	0.028
PT	2.320	n.s.	0.084	4.266	<0.05	0.053
D	0.779	n.s.	0.030	0.010	n.s.	0.001
HY	2.431	n.s.	0.088	0.147	n.s.	0.002
PD	**6.165**	**<0.01**	**0.196**	**7.877**	**<0.01**	**0.094**
MF	1.958	n.s.	0.072	2.253	n.s.	0.029
PA	1.342	n.s.	0.050	1.692	n.s.	0.022
SC	**11.573**	**<0.01**	**0.314**	**14.595**	**<0.01**	**0.161**
MA	**7.900**	**<0.01**	**0.238**	**15.643**	**<0.01**	**0.171**
SI	5.525	<0.01	0.179	5.898	<0.05	0.072
ANX	1.095	n.s.	0.041	1.305	n.s.	0.017
FRS	1.623	n.s.	0.060	0.375	n.s.	0.005
OBS	2.204	n.s.	0.080	4.744	<0.05	0.059
DEP	1.001	n.s.	0.038	0.955	n.s.	0.012
HEA	1.061	n.s.	0.040	0.345	n.s.	0.005
BIZ	2.442	n.s.	0.088	4.626	<0.05	0.057
ANG	2.656	n.s.	0.095	2.718	n.s.	0.035
CYN	1.431	n.s.	0.053	0.558	n.s.	0.007
ASP	1.674	n.s.	0.062	1.042	n.s.	0.014
TPA	1.221	n.s.	0.046	0.886	n.s.	0.012
LSE	0.358	n.s.	0.014	0.646	n.s.	0.008
SOD	0.672	n.s.	0.026	0.962	n.s.	0.013
FAM	1.714	n.s.	0.063	2.595	n.s.	0.033
WRK	2.099	n.s.	0.077	5.221	<0.05	0.064
TRT	0.232	n.s.	0.009	0.303	n.s.	0.004

Table 2. F ratio, significance level and partial eta-squared for the adjusted and unadjusted model by covariates (age and years of education) for each MMPI-2 Scale considered and comparing candidates for military enlistment with the control group participants.

Note. For three scales only, the results yielded a comparable pattern in the two models of analysis. The aforementioned three scales were those regarded as the ones to work on, in view of their importance and stability. Because these three scales show similar results both in the adjusted model and in the original unadjusted model, the covariates, i.e., age and education, will no longer be considered in the continuation of the present study.

Like in a previous study focused on faking good in forensic evaluation contexts (Martino et al., 2016), an index of the standardized scores obtained by participants for the scales that seemed to be most strongly affected by faking good was built, based on means skewed toward the faking good area. In such cases, the new score was then calculated by summing the skewed means in T scores for the scales PD, SC and MA. The MEDI was then calculated as follows:

MEDI= (50-PD)+(50-SC)+(50-MA)

This new index can yield positive or negative scores. Negative if one or more points are above the mean. Positive if one or more points are below the mean. The comparison between the two subgroups was significant at the analysis of variance in the expected direction MEDI: $F(1 ; 78)= 41.91$; $p < 0.001$; partial $Eta^2= 0.35$ (CTR: mean = -26.08; SD = 21.69; MEC: mean = 0.10; SD = 13.54).

Subsequently, a study was made using the ROC curve, to assess the area under the curve, the standard error, the significance and the 95% confidence intervals for the area under the curve (AUC) values. The optimal cut-off was also identified by applying the Youden index (J = sensitivity + specificity − 1) (Youden, 1950), the sensitivity and specificity values at the cut-off, and the positive and negative likelihood ratios. The results are summarized in table 3.

	AUC	Std. Err	Sig.		Optimal Cut-off	Se	Sp	RV+	RV-
				UL					
MEDI	0.86	0.041	<0.001	0.94	-11	0.85	0.78	3.9	0.19

Table 3.
Area under the curve (AUC) and relative standard error (Std. Error), level of significance (Sig.), 95% confidence interval (95% CI), Optimal cutoff, sensitivity (Se), specificity (Sp), positive (RV+) and negative (RV-) likelihood ratio for the MEDI scale.

Study 2

In the second study, to validate the MEDI index and the results obtained in study 1, the remaining MEC sample, now 212 candidates, was subdivided into the two original cohorts (based of two consecutive enlistment procedures): CO1 including 112 participants and CO2, 100 participants, each compared with the remaining control group subjects consisting of 108 volunteer respondents.

Statistics

After having identified in study 1 those scales used to build the MEDI index, they were used to compare the two cohorts CO1 and CO2 with the control group of volunteer respondents by analysis of variance and observation of the effect size (partial eta squared). As in study 1, the MEDI index was then applied and verified in a military assessment setting, applying the ROC curve.

Results

Table 5 shows the descriptive statistics for the demographic and selection variables, and the experimental variables that were the object of the present study. All the variables were found to be significant at ANOVA. This significance was due to the differences between the control group and the two cohorts of candidates for Military Enlistment. There were no differences between the two cohorts for any of the variables.

		N	Mean	Std. Dev.	F (2, 317)	p	partial eta-square
AGE (yy)	CTR	108	24.630	4.1392	4.62	< .05	0.03
	CO1	112	26.116	3.4004			
	CO2	100	25.410	3.2601			
EDU (yy)	CTR	108	14.556	2.7996	85.33	< .001	0.35
	CO1	112	10.589	2.5096			
	CO2	100	10.450	2.5121			
F-K (Raw scores)	CTR	108	-5.833	9.5325	44.71	< .001	0.22
	CO1	112	-14.170	6.4331			
	CO2	100	-14.290	5.9904			
LIE (T scores)	CTR	108	54.074	7.7214	45.21	< .001	0.21
	CO1	112	62.134	8.0857			
	CO2	100	62.950	7.4676			
MEDI	CTR	108	-27.98	32.264	53.43	< .001	0.25
	CO1	112	2.21	20.042			
	CO2	100	1.44	18.242			

Table 4.
Sample size, mean and standard deviation by three combinations of two of MA, SC and PD MMPI-2 scales and for MEDI for the three subgroups of Military Enlistment Candidates (CO1 and CO2) and control respondents (CTR).

The ROC statistics were applied separately for the two cohorts, comparing them with the control group (see tables 5 and 6).

	AUC	Std. Error	Sig.	95% CI		Optimal Cut-off	Se	Sp	RV+	RV-
				LL	UL					
F-K	0.762	0.032	<0.001	0.70	0.83	-10	0.76	0.66	2.2	0.36
LIE	0.770	0.032	<0.001	0.71	0.83	58	0.7	0.71	2.4	0.42
MEDI	0.790	0.031	<0.001	0.73	0.85	-11	0.85	0.78	3.9	0.19

Table 5.
Area under the curve (AUC) and relative standard error (Std. Error), level of significance (Sig.), 95% confidence intervals (95% CI), optimal cut-off, sensitivity (Se), specificity (Sp), positive (RV+) and negative likelihood ratio (RV-) for each scale in Cohort 1.

	AUC	Std. Error	Sig.	95% CI		Optimal Cut-off	Se	Sp	RV+	RV-
				LL	UL					
F-K	0.76	0.033	<0.001	.71	.83	-10	0.76	0.66	2.2	0.36
LIE	0.80	0.031	<0.001	.74	.86	58	0.74	0.71	2.5	0.37
MEDI	0.79	0.032	<0.001	.73	.85	-11	0.82	0.7	2.7	0.25

Table 6.
Area under the curve (AUC) and relative standard error (Std Error), level of significance (Sig.), 95% confidence interval (95% CI), optimal cut-off, sensitivity (Se), specificity (Sp), positive (RV+) and negative likelihood ratio (RV-) for each scale in Cohort 2.

Finally, (see table 7) the diagnostic sensitivity of MEDI was compared with LIE and F-K indexes pairing the level of specificity. In other terms, the proficiency of different indexes in discriminating probable faking good candidates in military enlistment is evaluated establishing a suitable and comparable level of specificity, say 0.85.

		Sp (fixed)	Se (95% CI)
Cohort 1 (CTR = 108, CO1 = 112)	F-K (Raw scores)	0.85	0.45 (0.35 - 0.54)
	LIE (T scores)	0.85	0.63 (0.54 - 0.72)
	MEDI	0.85	0.68 (0.58 - 0.76)
Cohort 2 (CTR = 108, CO2 = 100)	F-K (Raw scores)	0.85	0.47 (0.37 - 0.57)
	LIE (T scores)	0.85	0.56 (0.46 - 0.66)
	MEDI	0.85	0.65 (0.55 - 0.74)

Table 7.
Values and 95% confidence intervals of diagnostic sensitivity for F-K, LIE and MEDI indexes, pairing the level of specificity.

Discussion

The MMPI-2 test scales found to be most strongly affected by manipulation for the purposes of faking the results were the PD (psychopathic deviance); SC (referable to unusual and bizarre experiences, typical of psychotic subjects) and MA (hypomania). The finding that the basic scales revealed the greatest effects confirms the results previously obtained for the dissimulation index in the forensic context (FEDI). In that case (Martino et al., 2016), together with scale L, the scales HS and PT were involved. In the present case, it was judged preferable not to include scale L, that was used during the sample selection phase of candidates with a high likelihood of attempting faking good and for comparison in the validation phase. To understand the reasons that induce candidates to manipulate their answers to these three scales specifically, it is firstly important to underline the selection context that was the object of this study, namely military enlistment procedure. It is possible that in a setting where attempted faking good is very much to be expected and to some extent also functional, because it points out a marked ability to adopt coping strategies in order to reach a goal, candidates may pay particular attention to those items they believe are incompatible both with the aim of appearing to be in good health and, more specifically, with military life. In this context it must be remembered that: 1) PD scale includes items specifically aimed at identifying lack of emotional control, a tendency to ignore social and moral behavioral rules, as well as impulsiveness, aggressiveness, egocentrism and mental instability; 2) SC scale investigates symptoms and perceptions clearly linked to mental disease, and so it may be expected that subjects undergoing selection procedures will make strong efforts to deny any aspects they intuitively feel are linked to psychotic disorders; 3) MA scale probes some aspects that are well tolerated, and indeed sought for in the common image of the military, such as ambition, an extrovert personality, a good capacity to concentrate, self-confidence, a minor perception of anguish, leadership qualities (considered as initiative, a tendency to take control, authority), provided their expression is not too marked. It is therefore expected that dissimulating respondents will attempt to obtain low scores for this scale. Going more deeply into the specific characteristics revealed by each scale, their incompatibility with the profile typically required in military personnel appears evident. The first scale found to be affected, Psychopathic Deviance, for example, reveals a lack of emotional control, defiance of social and moral behavioral norms, aggressiveness, impulsiveness, egocentrism, mental instability. The public image of military personnel is quite the contrary, featuring high self-control, both of emotional reactions and of behavior, compliance with behavioral norms (maximum respect for orders and hierarchy), interest in others (these personnel operate in the public interest). The second scale, Schizophrenia, measures the presence of all those symptoms typically associated with psychiatric disorders: uncommon and bizarre convictions, experiences and perceptions, delusions, hallucinations, psychotic manifestations, etc. These characteristics are considered alienating in general, and likely to impair performance in any walk of life, but are certainly incompatible with military life and hence with the image that candidates aspiring to enlist wish to project. Finally, the third scale shown to be efficacious, Hypomania, probes a whole series of aspects and exaggerated attitudes, such as over-excitability, hyperactivity, difficulties in controlling impulses, a tendency to rebel and to become hostile,

all of which are again contrary to the public image of military personnel as highly controlled and compliant with the rules and schemes laid down in military orders and honed during training.

Thus, the combination of these three scales that measure such important and relevant characteristics provides an overall index of faking good tendencies in this very particular, specific study group. In fact, the MEDI showed a satisfactory performance in discriminating enlistment candidates from volunteer respondents both at analysis of variance and in terms of diagnostic accuracy.

A MEDI score of -11 or more was about 4-fold more likely in military enlistment candidates than in volunteer, genuine respondents. This demonstrates the need to make more in-depth assessments of true military enlistment candidates. Moreover, the MEDI was shown to be able to make an adequate discrimination (the loss was smaller than in study 1) of the candidates in both the first and the second cohort. It demonstrated an equivalent and, in some cases, better assessment ability than the much longer-standing indexes LIE and F-K (see tables 5 and 6). Moreover, pairing the MEDI, LIE and F-K on specificity, MEDI showed the better sensibility in both cohorts (see table 7). Therefore, the MEDI may be a useful supplementary assessment tool that can provide practical support in selection processes, calculated from already standardized scales. In two independent assessments (study 2) the MEDI yielded encouraging, stable and significant results on the candidates, that had not been previously taken into account during the first phase when building the index (study 1). Nevertheless, it is necessary to take into consideration the fact that the two samples MEC and CTR differed significantly in terms of age and years of education. This mismatch between the experimental group of military enlistment candidates and the control group of volunteer respondents is a limit of the present study. Another weak point may be the use of only one control group of volunteer respondents in comparisons with two cohorts of experimental subjects (study 2). These sampling aspects have prompted us to improve this kind of real life studies for future replications, to check whether the present results still hold good.

Conclusions

Faking good is observed (and expected) in many conditions that require individuals to undergo assessment in order to check whether they have certain abilities and can thus obtain some particular advantage (assessments to ascertain whether to grant continued parental authority, a driving license, permission to continue to work in a particular context, etc.). The attitude poses a severe risk of invalidating the selection procedure unless it is easily identifiable. Despite their importance, the phenomena of reverse malingering and faking good have been little studied, likely also because they are difficult to demonstrate. Analysis of the scarce literature on this point shows that the currently available indexes are not sufficiently sensitive and more reliable and less socially widespread indexes are needed. Moreover, as can well be expected, different assessment contexts require the investigation of different psychological characteristics of candidates, because in each ambit the focus is on the psychological traits relevant to that specific setting. It is obvious that the relevant psychological aspects for granting a driving license are quite different from those considered relevant for employment selection processes, especially in such sensitive fields as military service. The present work, focusing on faking good, was conducted with the aim of identifying an index that could reliably discriminate military enlistment candidates from volunteer respondents with no motive to adopt faking good tactics. Confirming the working hypothesis, the MMPI-2 scales that contributed to the construction of this index were not the same as those identified as most sensitive in a previous study (Martino et al., 2016), which was aimed at developing an efficacious faking good index for use in forensic settings. In fact, in the present work the results of study 1 demonstrated that the scales measuring Psychopathic deviance (PD), Schizophrenia (SC) and Hypomania (MA) were particularly discriminant. In Italy, the indications about the required psychological traits listed in selection processes for military enlistment are not very specific nor detailed (consisting of generic statements like "personality assessments through the administration of appropriate tests, interviews probing the psychological profile and if necessary, a psychiatric visit") so it is reasonable to expect that candidates will tend to minimize any aspects associated in public opinion with mental disease, such as antisocial tendencies and psychotic behavior, any uncommon or bizarre beliefs, experiences or perceptions, and typical schizophrenic traits, as well as any lack of control of actions and reactions (associated with behavioral traits like euphoria, aggressiveness or hyperactivity).

In conclusion, we believe that a study model based on participants who are truly motivated to adopt simulation / faking good behavior should provide more reliable long term results. The main reason for this is that in different contexts respondents are prone to manipulate (if so minded) quite different test scales that depend on the context, such as the FEDI index (Martino et al., 2016) in the forensic setting and the MEDI index we introduce herein. The MEDI offers important indications about military enlistment candidates' tendencies to manipulate personality traits that are extremely relevant to military enlistment procedure. Hence the importance of applying it in a setting where the MMPI-2 test is already widely used and in a sense quite well known to prospective candidates, and in turns, easier for them to devise faking good strategies. The MEDI offers further assessment and screening indications, and therefore helps to boost the efficacy of preliminary selection processes by minimizing the impact faking good could have on enlistment procedure. The study also confirms that this category of tools provides promising results for the prevention of faking in particularly critical settings, not only for the selection of military, police and vigilance personnel but in general, in all contexts offering some type of advantage, and granting a right that could potentially cause harm to other people, like granting a driving license or license to carry a firearm. Anyway we must always bear in mind that there is

no automatic coupling between the single test response and its psychological meaning, given that only the global evaluation of the whole test (or better, of more associated tests), connected to all the remaining part of the clinical evaluation, it can allow to advance hypotheses of an explanatory and diagnostic type. Furthermore, it is good to underline and reiterate that the test in any case can not provide complex diagnoses, but certainly provides the clinician and/or the researcher with relevant support to the diagnostic process from an evidence-based perspective. The testistic support also aims to reduce the variability existing between judgments formulated by different examiners and at different times, thus increasing the reliability of the diagnostic result. So the authorizations requested and obtained and the awareness of the limits of our work, only in terms of scientific study, without any undue clinical or evaluative extension on the subjects recruited in the research, guaranteed the maximum respect for the privacy of the subjects involved, not going beyond, with anamnestic or clinical or psychological/psychiatric evaluations, judgments, which were not the objectives of our study.

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