

The Efficacy of the MMPI-2 Superlative Scale in Assessing Underreporting in Police Applicants

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Abstract

The study examined the efficacy of the S scale in the Minnesota Multiphasic Personality Inventory-2 (MMPI-2), in detecting police applicant's tendency to present in a superlative manner. The MMPI-2 was administered to 1309 male and 494 female applicants, age ranging from 18 - 57 years ($M = 26.31$, $SD = 6.16$) and unidentifying information was made available for analyses. Descriptive statistics demonstrated elevated scores on all underreporting scales and low scores on overreporting indices. Findings indicated that the S scale is more elevated than the L and K scale, further revealing that applicants tended to produce low scores on psychopathology oriented scales. Correlational analyses showed that the S scale positively correlated with all other underreporting scales and its incremental validity revealed the S subscales resemble other underreporting scales. Hierarchical regression analyses revealed the combination of K, Odec, and Pa3 accounts for 79.6% of the variance of S. Results of this study indicate that the S scale appears somewhat oversensitive in identifying applicants who are underreporting.

Keywords: MMPI-2; Superlative Scale; Defensiveness; Police Applicants; Impression Management; Job Applicants; Underreporting

Introduction

Longstanding recognition of underreporting has been evidenced in personnel screening [1]. Objective psychological tests have been acknowledged as potentially augmenting clinical impressions and assisting in the selection process of applicants where conscious attempts are made by personnel to respond in an unrealistically positive light [2,3]. Personnel selection in law enforcement has been significant not only for organizational effectiveness, but also for the protection of other police officers and the general public.

The Minnesota Multiphasic Personality Inventory (MMPI) and its revised edition (MMPI-2) have been extensively used in pre-employment evaluations of police officers [4-9]. A number of studies have supported that administering the MMPI/MMPI-2 improves the employment selection process [5,6,8,10-15]. Several authors have posited that the usefulness of test-based assessment in personnel selection using the MMPI-2 far exceeds that of the clinical interview [16-19].

Police applicants may be motivated to convey a particular impression when undergoing psychological evaluation by trying to deny or conceal difficulties they have, or claiming to possess more positive characteristics than is the case. Factor analyses conducted on the social desirability scales of the MMPI by Block (1965) presented clusters around two factors, Alpha and Gamma, representing self-deception and impression management respectively in the MMPI [2]. Impression management involves consciously attempting to present oneself in a positive light while self-deception refers to the acceptance of one's positive self-reports [2]. Recognition of response tests that may skew or invalidate the test results is critical when evaluating the presence or absence of psychopathology. Police officers require a high degree of emotional adjustment and stability. Hence, the accurate screening of personality characteristics or psychopathology that may pose a risk to job performance and the safety of others is imperative [20].

The MMPI-2 has been the instrument of choice in screening of job applicants where safety and protection of the public are paramount. It is the most well researched, well validated and most comprehensive multiscale psychopathology tool [21]. A large body of research has confirmed the ability of the MMPI-2 to detect unusual styles of responding to test items in both clinical [22] and non-clinical settings [23-29].

The proficiency of the MMPI to detect “fake- good” profiles had not been well substantiated. The results of Butcher’s [20] study demonstrated that the MMPI-2 norms were more pertinent for characterising pilot applicants than the original MMPI norms, which inclined to overpathologise test takers. Butcher [20] suggested that the MMPI-2 profiles, such as those of pilot applicants should show an extremely non-pathological response presentation resulting in below average clinical scale scores in the profile. As would be expected, after extensive pre-screening on psychological assessment, those individuals who were generally defensive in their response set to items produced mean clinical scale scores that were below the mean of the normative sample.

A number of validity scales have been developed to help identify underreporting response styles. Other than the traditional Lie (L) and Correction (K), several other scales for detecting underreporting have been developed including the Wiggins Social Desirability scale (Wsd), the Other Deception scale (Odecp) and the Superlative scale (S). The S scale developed by Butcher and Han [30], consists of items showing to discriminate between a large groups of pilots seeking employment with a major airline from the MMPI-2 normative sample. The resulting scale was developed in an effort to improve understanding of the overly positive response attitude and the tendency to claim extreme virtue through presenting oneself in a superlative manner. A factor analysis of the resulting 50 items produced 5 subscales. These included, Beliefs in Human Goodness (S1), Serenity (S2), Contentment with Life (S3), Patience/Denial of Irritability and Anger (S4) and Denial of Moral Flaws (S5). The content of the S scale is concerned with benevolence, serenity and freedom, from impatience and irritability [31]. The subscales S1, S2 and S3 are concerned with positive assertions whereas subscales S4 and S5 reflect the negative aspects of defensiveness.

When developing the S scale Butcher and Han’s [30], aim was to develop a measure of superlative claim assertions that could detect the attempt to claim overly positive self-representation and would not be as susceptible to conscious distortion (e.g. Scale L). Moreover, the potential scale would allow for a clearer evaluation of test defensiveness than the K scale is able to do for respondents from the normal population. Unlike the K scale, which was developed with hospitalised patients, the S scale has the distinction of being created solely to measure defensiveness and was developed with a normal population.

Both traditional indicators of faking good such as (L, K, K+F, and L-K) as well as less familiar indicators such as (Mp, Wsd, Esd and S) have shown efficacy in the detection of faking good [32].

Nicholson., *et al.* [33] in his comparison of seven different underreporting measures found that all measures were reasonably effective at identifying college students who were underreporting psychopathology, with the S scale performing the best and the F-K index performing the least well. Bagby., *et al.* [24] found that the Wsd and the S scales were more useful in identifying defensive underreporting of child custody litigants than the L and K scales. The S scale has performed very well in studies that compare the ability of different underreporting indices to discriminate MMPI-2 protocols completed under instructions to fake good, from one completed under standard instructions, in at least two such studies [24,34]. The S scale appears to be at least as sensitive to self- favourable versus self- unfavourable test taking attitudes [21].

According to Friedman., *et al.* [31], the S scale does show some promise in the detection of certain common types of underreporting. However such promising performance could suggest that S may be somewhat oversensitive in detecting defensiveness and portrayal of positive impression. This could explain why the S scale has performed so well in detecting underreporting when discriminating MMPI-2 tests completed under instructions to fake-good from one completed under standard instructions.

Despite the abovementioned promising research findings, the S scale has yielded mixed results in detecting underreporting and a number of questions, can be raised about its origins and applications. The S scale has been scrutinised for being developed on a well-educated white male criterion group [35]. The use of male samples, and thus the likelihood of greater sensitivity to underreporting and self-deception in males compared to females is reason for concern about the meaning and interpretation of S even among males. In short, the S criterion group was likely composed of several subgroups of unknown size and uncertain influence in determining the ultimate composition of the S scale. Moreover this criterion group was atypical in many ways- all were four-year college graduates, and virtually all Caucasian, successful in good health and of higher socioeconomic status (SES). Hence caution needs to be used when interpreting profiles of women, ethnic minorities and individuals with lower SES [36]. Graham [37], proposed that the S scale is not as effective as other validity scales in identifying defensiveness and faking good among clinical populations.

Furthermore, given that previous research has consistently reported that S is commonly more elevated than L and K scales [24,38-44] it would be plausible to suggest that more profiles would be considered invalid based on the criteria S exceeds a t-score of 65. Although a t-score of 65 usually implies an elevated score, this is not standard for interpreting S as being elevated in any setting. This may lead one to believe that it is oversensitive as a scale in the measurement of defensiveness, hence suggesting redundancy [38,39]. Subsequently, there is a need for research in evaluating the effectiveness of the S scale since relatively few studies have examined this to date. Furthermore, there is a genuine need for research in evaluating job applicants correctly on various scales of the MMPI-2 under conditions in which individuals are known to be distorting their responses to the MMPI-2.

The unique nature of law enforcement work calls upon selection procedures that concentrate on emotional strengths and weaknesses as well as reveal abilities to cope with demanding circumstances. Due to the nature of the work, inordinately high levels of coping ability are required of police officers as well as the ability to adapt to unusual demands as they expose themselves to danger on a daily basis and need to be prepared to confront life-threatening circumstances.

In general, police applicants are an unusually well-functioning group psychologically [30]. As a group, police applicants are a highly selected group in terms of psychological adjustment, because individuals with psychological problems are likely to be eliminated. Police applicants tend to minimise adjustment problems and present their favourable self, when taking the MMPI-2 in pre-employment screening.

The possibility of job applicants presenting defensively and underreporting problems is particularly concerning, given the high incidence of defensive responding in pre-employment screening [45]. The S scale was developed in an attempt to detect underreporting in job applicants; however mixed results have brought its validity into question. The current study was designed to assess the efficacy of the S scale in a personnel selection setting, where a higher incidence of defensive responding is common, specifically that of applicants for the police force.

Method

Participants

In total 1806 police applicants formed the sample under investigation of which 1803 provided usable data. Three participants were excluded from the study because of incomplete protocols. The MMPI-2 was administered to 1309 male and 494 female applicants. Just over one quarter of the sample were female, $n = 494$ (27.4%). Their ages ranged from 18 to 51 years, with a mean age of 26.31 (SD = 6.16). One thousand three hundred and nine applicants were male (72.6%) and ranged in age from 18 to 57 years with a mean age of 27.8 (SD = 6.99). The number of years of education was not recorded on the respondent protocols all applicants had a minimum number of 9 years of education and ranged from 9 to 13 years of education. This information was provided to the researchers by Victoria police.

Materials and Procedure

The only psychometric test used for this study was the MMPI-2, which each applicant completed. The MMPI-2 is a 567 item, true-false, paper and pencil inventory developed by Butcher, *et al.* [46] to assess a wide range of personality and clinical psychopathology. Its primary scales consist of three validity and ten clinical scales measuring a range of psychopathological symptoms and syndromes.

The clinical scales are 1 (Hypochondriasis), 2 (Depression), 3 (Hysteria), 4 (Psychopathic Deviate), 5 (Masculinity-Femininity), 6 (Paranoia), 7 (Psychasthenia), 8 (Schizophrenia), 9 (Hypomania), and 0 (Social Introversion). The validity scales are the Cannot Say Scale (?), the L Scale, the F Scale, the K Scale, the Back-Page Infrequency Scale (Fb), the Variable Response Inconsistency Scale or VRIN, and the True Response Inconsistency Scale or TRIN [47]. The two validity scales which are related to minimization/defensiveness are the L scale and the K scale. The Infrequency (F) scale is indicative of inconsistent responding due to inattention, exaggeration, or uncooperativeness. In addition, developments of the MMPI-2 have included the S scale to augment the L and K scales.

The S scale was designed to detect unusual virtuous responding. Initial studies by Butcher and Han [30] indicated high correlated relationships between S and K (in men $r = .81$, and women $r = .82$). The S scale is much more homogenous and also contains broader content coverage than the K scale. Initial studies depicted a high degree of internal consistency, a Cronbach’s alpha of .86 for men and .85 for women in the normative sample.

Results

Descriptive statistics for the Basic scales, underreporting and overreporting indices are depicted in table 1. Descriptive statistics demonstrated elevated scores on all underreporting scales and low scores on overreporting indices. The results of the study are presented in two parts. The first part reports correlations between the underreporting indices used in the study and the intercorrelations of the S subscales. The second part presents the results of a multiple regression hierarchical regression and is followed by the results of a cross validation sample to examine whether S can be predicted or estimated accurately using other scales. This relates to determining the incremental validity of S and examines whether or not this scale fundamentally adds to the interpretive process.

| | Mean | SD |
|-------|-------|-------|
| L | 61.24 | 12.12 |
| K | 60.82 | 7.97 |
| S | 65.97 | 8.56 |
| Wsd | 59.57 | 9.49 |
| Odecp | 63.97 | 0.06 |
| F | 43.26 | 4.84 |
| FB | 43.19 | 2.94 |
| Ds-r | 40.02 | 6.49 |
| HS | 47.24 | 5.91 |
| D | 45.08 | 6.07 |
| HY | 47.88 | 6.21 |
| PD | 49.43 | 6.93 |
| MF | 48.57 | 12.47 |
| PA | 45.89 | 7.16 |
| PT | 46.57 | 5.92 |
| SC | 46.62 | 5.40 |
| MA | 51.19 | 7.86 |
| SI | 38.19 | 5.54 |

Table 1: Descriptive statistics for the validity and basic scales of the MMPI-2.

Section 1 Correlations between validity scales

The Correlations between the validity scales are reported in table 2. For the purposes of the study, a p value of 0.01 was used.

| | L | K | S | Wsd | Odecp |
|-------|------|------|------|------|-------|
| L | 1.00 | | | | |
| K | 0.51 | 1.00 | | | |
| S | 0.55 | 0.84 | 1.00 | | |
| Wsd | 0.62 | 0.17 | 0.24 | 1.00 | |
| Odecp | 0.74 | 0.43 | 0.52 | 0.86 | 1.00 |

Table 2: Correlations between the underreporting scales of the MMPI-2.

Note: All correlations significant at $p < .01$.

Table 2 indicates that all correlations were significant. Substantial correlations (those that were higher than 0.5 indicating at least 25% shared variance between the variables) were observed in a number of correlations: L was consistently moderately to highly correlated with all other scales, S with K, $r = 0.84$ and S with Odecp, $r = 0.52$ and Odecp with all other scales with the exception of K. These correlations suggest that there may be significant overlap in the underlying constructs that each scale measures.

To evaluate the possible relationships among the S scale subscales, correlations between the subscales were computed using the police applicant sample. The results of these analyses are given in table 3.

| | S | S1 | S2 | S3 | S4 | S5 |
|----|------|------|------|------|------|------|
| S | 1.00 | | | | | |
| S1 | 0.81 | 1.00 | | | | |
| S2 | 0.80 | 0.45 | 1.00 | | | |
| S3 | 0.72 | 0.40 | 0.57 | 1.00 | | |
| S4 | 0.76 | 0.49 | 0.56 | 0.50 | 1.00 | |
| S5 | 0.54 | 0.29 | 0.44 | 0.35 | 0.39 | 1.00 |

Table 3: Correlations between Scale S and all its subscales of the MMPI-2.

Note: All correlations significant at $p < .01$.

It was noted that all correlations were significant. As expected “substantial” correlations were observed between S and all its subscales, S2 with S3, $r = 0.57$ and S2 with S4, $r = 0.56$ and S3 with S4, $r = 0.50$. These correlations suggest that there may be some overlap in the underlying construct that each scale measures. This is not unexpected as correlations between subscales and the parent S scale reflect a part-whole relationship, which will inflate the correlation coefficient.

Section 2 Hierarchical regression analyses

Hierarchical regression analyses were conducted to examine the degree to which S uniquely contributes to MMPI-2 interpretation. If after all, S can be computed with a high degree of accuracy by a combination of existing scale, the rationale for adding yet another MMPI-2 scale to the already lengthy interpretive process would be unjustified. For the purposes of this study, the sample was randomly divided using SPSS into two groups of 929, and 873, the first to develop regression equations, the second to cross validate the solution.

Table 4 displays the hierarchical regression analysis predicting the S scale. In the model all the underreporting scales used in the study were added as well as Ma3, Pd3, Pa3, Hy1 and Hy2 as these were thought to be useful in accounting for the variance of S since they were all subclinically elevated (t score between 55 and 65).

| Model Summary | | | | | | | | | |
|---------------|------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
| | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
| Model | | | | | R Square Change | F Change | df1 | Df2 | Sig. F Change |
| 1 | .836 | .700 | .699 | 4.632 | .700 | 2160.159 | 1 | 927 | .001 |
| 2 | .859 | .738 | .737 | 4.331 | .038 | 134.198 | 1 | 926 | .001 |
| 3 | .881 | .776 | .775 | 4.007 | .038 | 156.685 | 1 | 925 | .001 |
| 4 | .887 | .787 | .786 | 3.905 | .012 | 50.029 | 1 | 924 | .001 |
| 5 | .892 | .795 | .794 | 3.835 | .008 | 35.073 | 1 | 923 | .001 |
| 6 | .892 | .796 | .795 | 3.824 | .001 | 6.203 | 1 | 922 | .013 |

Table 4: Hierarchical Regression Analysis other scales efficacy to account for the variance of S Scale.

- 1: Predictors: (Constant), K
- 2: Predictors: (Constant), K, Odecp
- 3: Predictors: (Constant), K, Odecp, Pa3
- 4: Predictors: (Constant), K, Odecp, Pa3, Wsd
- 5: Predictors: (Constant), K, Odecp, Pa3, Wsd, Hy2
- 6: Predictors: (Constant), K, Odecp, Pa3, Wsd, Hy2, Ma3.

With this sample the combination of variables together explain 79.6% of the variance in the S scale. To determine the best model the solutions were examined for multicollinearity. The best model, which was Model 3, was selected as that which best predicted the S scale without introducing collinear measures. As application using model 3 is given in the following example.

Development Sample

S t-score = 2.998 + .616(K) + .196 (Odecp) + .238 (Pa3)
 R = .881 R² = .776 SEE = 4.00
 S Mean = 65.97 (SD = 8.45)
 Spread Mean = 65.95 (SD = 7.49)
 Cross Validation Sample
 R = .894 R² = .799 SEE = 3.88
 S Mean = 65.97 (SD = 8.69)
 Spread Mean = 66.34 (SD = 7.41)

This indicates that from the development sample of 929 cases we have a combination of three scales (K, Odecp, Pa3) that account for almost 78% of the variance of the S scale. This is very high and challenges whether scoring the S scale offers further information from what is inferred from the combination of K, Odecp and Pa3. The cross validation sample (N = 873) generated comparable R, R² and SEE indicating that there is little to no shrinkage in the formula when applied to a second sample and we still account for close to 80% of the variance of the S scale.

This also suggests that K, Odecp and Pa3 scales essentially contribute independently to the S scale and therefore may represent different ways in which S can be elevated. Correlations between the S subscales, the K, Odecp and Pa3 scales were computed using the police applicant sample in order to evaluate the possible relationships among these scales, and to determine whether the three scales bear any resemblance to the S subscales. Table 5 displays the results of these analyses.

| | S1 | S2 | S3 | S4 | S5 | K | Pa3 | Odecp |
|-------|------|------|------|------|------|------|------|-------|
| S1 | 1.00 | | | | | | | |
| S2 | 0.45 | 1.00 | | | | | | |
| S3 | 0.40 | 0.57 | 1.00 | | | | | |
| S4 | 0.49 | 0.56 | 0.50 | 1.00 | | | | |
| S5 | 0.29 | 0.44 | 0.35 | 0.39 | 1.00 | | | |
| K | 0.74 | 0.67 | 0.59 | 0.63 | 0.36 | 1.00 | | |
| Pa3 | 0.79 | 0.40 | 0.33 | 0.44 | 0.24 | 0.62 | 1.00 | |
| Odecp | 0.17 | 0.64 | 0.54 | 0.37 | 0.39 | 0.43 | 0.19 | 1.00 |

Table 5: Correlation between the subscales of S and the K, Odecp, and Pa3 scales of the MMPI-2.

It was noted that all correlations were significant. Moderate to strong correlations coefficients were observed in a number of correlations: S1 with K, $r = 0.74$ and with Pa3, $r = 0.79$, S2 with K, $r = 0.67$ and with Odecp, $r = 0.64$, S3 with K, $r = 0.59$ and with Odecp, $r = 0.54$ and with S4 with K, $r = 0.63$. These correlations suggest that there may be some overlap in the underlying constructs that each scale measures.

Discussion

This study explored the effects of underreporting of symptoms on traditional and supplementary underreporting scales of the MMPI-2. The MMPI-2 norms typify police officers as below the mean on all scales measuring psychopathology. Findings of elevated scores on the underreporting scales (L, K, S, S subscales, Wsd, and Odecp) indicated that applicants denied significant psychological maladjustment and presented in an unrealistically favourable light. Furthermore police applicants produced lower scores on all the overreporting indices (F-K, F, Fb, Fp, FBS, Ds, and Ds-r), indicating that they are not endorsing psychopathology.

The S scale was found to be twice as likely to be elevated than other underreporting scales. This is consistent with previous findings [24,38-44] which found the S scale to be more elevated than traditional L and K scales. Police applicants produced low scores on psychopathology oriented scales suggesting possible underreporting of psychological difficulties, lending support to previous research [11,26,30,39,48-50] that suggested clinical, content, and supplementary scales are suppressed amongst respondents who are underreporting.

The S scale positively correlated with all the underreporting scales (L, K, Wsd, Odecp) which support findings [38,46] indicating that underreporting scales are intercorrelated. The S subscales also correlated significantly with S, supporting previous findings [30] and suggests that the subscales are measuring a single underlying dimension of superlative self-reporting. Finally, the role of S and its incremental validity revealed that the S subscales do bear resemblance to other underreporting scales.

High mean elevations were obtained on both L and K, with 39.8% of the police applicants sample producing L scores greater than a t-score of 65, and 37% of the police sample producing K scores greater than a t-score of 65. Furthermore, high mean elevations were obtained on both Wsd and Odecp, with 28.6% of the police sample and 49.7% respectively, producing t-scores greater than 65. Finally high mean elevations were obtained on S and most of its subscales, with 63.3% of the police sample producing S scores greater than a t-score of 65, and 64.8% producing S2 (Serenity) scores greater than a t-score of 65. Low mean scores on all the overreporting indices provide further support that police applicants responded defensively on the MMPI-2.

Results indicate the S scale appears to be more sensitive than L and K in detecting underreporting, which suggests S may be a better underreporting measure since it is detecting positive and negative attributes of defensiveness and overly virtuous responding to a greater extent. However given that police applicants are likely to not underreport substantial clinical problems, it remains unclear whether S is more accurate than the L and K scales in detecting underreporting in this particular police applicant group.

Previous research has indicated that a number of studies involving custody litigants, airline pilot and police applicants have used the criteria of a t-score higher than 65 on both L and K scales to detect underreporting [24,38-42]. Baer and Miller [51] in their review identified that an average of 30% of applicants were classified as under-reporters. In the current study the base rate of defensiveness as identified by the L and K scales is close to .40, which is higher than the studies reported. The use of the S criterion elevated the results more than twice the established base rate of 30% for defensiveness in job applicants reported in literature [51], suggesting that the S scale may be somewhat oversensitive in identifying police applicants who are underreporting.

The frequency of the elevations on S suggests that this scale may be vulnerable to elevated responses in “normals” who are presenting an overly favourable response pattern. As most police applicants have a t-score of 65 (63.3%) on the S scale, it may be lacking sufficient range to evaluate different degrees of defensiveness amongst the sample. According to Nichols [36], elevations on the S scale exceeding a t-score of 70 indicate underreporting to the degree that the clinical profile is distorted and content scale scores are markedly suppressed. This leads the S score to cluster at the very high end of the scale causing a very high proportion of the MMPI-2 protocols to be considered distorted and uninterpretable. By relying solely on the S scale as an indicator to identify under-reporters, two thirds of applicants would be rejected on the grounds of supposed defensiveness without evidential support, thus restricting the S scale as an appropriate measure in indicating whether a profile is invalid. This raises questions about the efficacy of the S scale to correctly identify positive response distortion.

Correlational analyses revealed that S correlates positively with all the underreporting scales (L, K, Wsd, Odecp), suggesting they are all measures of defensiveness and there may be significant overlap in the underlying constructs that each scale measures. Specifically, S correlated highly with the K scale and moderately with L and Odecp, suggesting that they may be measuring similar dimensions or constructs.

The L scale, similar to S5, reflects denial of moral flaws, while Odecp scale similar to S scale, reflects self-confidence and denial of problems. Furthermore, correlational analyses revealed that all subscales are moderately intercorrelated suggesting that all subscales are a good measure of an exaggerated pattern of virtuous values and a problem free expression.

The hierarchical regression analyses indicated that the S scale can be predicted accurately by the combination of K, Odecp, and Pa3 scales. This model accounted for approximately 78% of the variance of S in the developmental sample and generated comparable variance to the S scale in the cross validations sample. These findings challenge the S scale's ability in providing additional information to the K, Odecp, and Pa3 scales. Moreover, this suggests that K, Odecp, and Pa3 can contribute independently to S and may represent different ways in which S can be elevated. This implies that the combination of K, Odecp, and Pa3 offers as much as the S scale does, without being as sensitive to underreporting and self-deception.

Correlational analyses revealed resemblance between K, Odecp, Pa3 and S subscales (i.e., S1, S2, S3, and S4). The K scale appears to be detecting respondents who are consistently trying to maintain a façade of adequacy and control and are admitting no problems of weaknesses. Subsequent research had confirmed that K scale scores are significantly related to self-acceptance, poise and comfort in social situations, and adjustment level among college students [52]. The K scale is intended to identify more sophisticated attempts to present oneself in a favourable light. According to Caldwell [53], the K scale is the most subtle personality scale ever built that mathematically elevates scales in the context of defensive reporting and lowers scales in the context of exaggeration. Research on the K correction has consistently noted that it adds noise to correlations as reflected by the fact that the official Pearson scoring now provides non-K corrected scale scores.

The Odec scale is highly associated with S2 and S3. The item content on the Odec scale reflects confidence in oneself and one's abilities and denial of psychological or minor problems, which appear to be measuring similar constructs to S2 and S3. High scorers on S2 report that they take a peaceful, confident, and unhurried approach to living, while high scorers on S3 reports virtually complete contentment with family, work and finances.

Pa3 (Moral virtue) was highly associated with S1 and both appear to resemble one another. The item content of Pa3 is an indication of overly optimistic, extremely high moral standards and denial of hostility. Similarly, S1 measures benevolence and the denial of misanthropic attitudes. In examining the item content of Pa3 it is apparent that it shares 4 of its items with S1, which tap into the distrust of others (Belief in human goodness). Similarly to S1, for most of the Pa3 items, the focus is on others rather than the self. It is correlated highly with the K scale, since it is sensitive to denial of problems or weakness.

The current findings propose two avenues for the use of the S scale. The first is that the S scale is not needed, as it can be computed accurately using the combination of the K, Odec and Pa3 scales. The second avenue would be to compare the predicted S score with the actual S score, to assess whether the traditional interpretation of the S scale applies. Similar predicted and actual S score can lead to the conclusion that applicants elevated S for the reasons assumed. However if a discrepancy existed, then the psychologist would be cued to examine the protocol in more detail to determine the underlying basis of responses. Furthermore, the combination of K, Odec and Pa3 scales would prompt the psychologist to investigate the test-taking attitude of the applicant, since the combination of scales offers both self-deception (SD) and impression management (IM) scales, thus aiding the discrimination between defensive applicants who are concealing psychopathology from those who are appearing well-adjusted.

The use of the Odec scale might be instructive in furthering the understanding of IM on the MMPI-2 [21]. The S scale would be limited in providing information on motivational test-taking attitudes as it is only a SD scale. Currently the non-traditional Odec validity indicator is the only of the three scales which is not routinely scored on the MMPI-2, however in light of its promising performance in combination with other scales, further replication may warrant its official introduction on the MMPI-2.

Personnel selection procedures are likely to encourage a number of applicants to respond defensively. The S scale does not appear to be discriminating between defensive and well-adjusted applicants, even though it is conceptualised as falling within the SD category based on its higher correlations with the K and Esd scales than with the L, Odec, and Wsd scales. Nichols [36] reported that t-scores above 70 on the S scale may also reflect IM. It is unclear whether it is just a SD scale, or a combination of both as clients are likely to consciously attempt to create a favourable impression in others, suggesting also that it may be an IM scale.

The uniqueness of police work calls upon selection procedures that accurately screens out ineligible applicants and that correctly recognises response sets that may skew or invalidate the test results when evaluating the presence or absence of psychopathology. The S scale may not be an appropriate indication as such since it identified 63.3% of applicants as defensive. This would be detrimental to the police force in terms of economic utility, if the force eliminated such a percentage of applicants. Graham [47] and Greene [21] proposed that when such underreporting invalidates the test profile, the examiner should consider the test results uninterpretable and refrain from speculative interpretation. They further proposed discussing these validity concerns with the respondent and subsequently readministering the test, suggesting that such re-testing often leads to a valid and interpretable profile. However, empirical support of this assertion is mostly absent from the existing literature and furthermore such retesting conditions are time consuming and require more expenditure.

An important limitation of this study is the lack of contact with police applicants and the sole use of raw data. This restricted the opportunity to make clinical judgements and impressions of applicants, instead the emphasis was only on interpreting the results of MMPI-2, thus it is not obvious whether the individual's positive self-evaluation is an overestimate of psychological well-being or a deliberate attempt to present favourably, nor can the motivations of the test-taker be determined. Moreover, information regarding the MMPI-2 is

readily accessible via libraries and bookstores; hence, motivated applicants may provide their own coaching and educate themselves about the presence and purpose of validity scales on the MMPI-2. It is therefore important to investigate feign underreporting, effects of coaching, and methods for detecting coached feigners. In order to achieve this, the utilisation of raw data alone will not be sufficient, more collateral information will be required in order to make conclusions. The findings of Baer and Miller's [51] review suggest that even the most effective underreporting scales will inaccurately label some test-takers. In attempting to minimise such errors, it may be important to consider other sources of information (i.e. interview data, behavioural observations, other self-report data) and collateral information when making decisions about individual protocols, as this increases the probability of correctly identifying a deceptive or dishonest applicant. Though additional research is clearly needed, these findings serve as a continuing step in developing methods for the detection of deception in law enforcement applicants.

A further limitation is that there was no information or lack of sufficient information on ethnicity, years of education, and socioeconomic status (SES) variables. According to Nichols [36] it is appropriate to use caution in interpreting the S scores of women, ethnic minorities, and individuals of lower SES. The analyses used in the current study does not take into account gender performances and therefore female profiles may have been prone to bias as the S scale was designed using male applicants. It was not evident whether the lack of information regarding ethnicity and SES influenced the results of this study.

Regardless of previous findings that the S scale was as or more effective than the traditional validity scales (L, K, and F-K) on the MMPI-2 in the detection of underreporting psychopathology, its efficacy is questionable. The S scale should clearly be the focus of further research to determine if it is oversensitive to detecting defensive responding and to determine how well and under what conditions the scale is sensitive to overly positive response styles. Future research should also follow up and investigate which of the applicants who would be considered inappropriate for the police force according to the S scale were deployed. It would be of interest to examine how many applicants the S scale correctly identified as underreporting.

Conclusion

In conclusion, the results of this study show that applicants screened in personnel settings frequently attempt to present the self in a superlative manner; thus calling into question the efficacy of the S scale. The current study was conducted in a naturalistic setting and hence results can be generalized to police applicants. The S scale identified approximately two-thirds of the applicants as underreporting, and thus may not be appropriate in police selection as the S scale appears to be somewhat over sensitive. Given this finding, more appropriate measures needs to be constructed to screen out applicants who are concealing psychopathology. The combination of the three scales, K, Pa3 and Odecp are an alternative to the S scale and may make the discrimination between IM and SD more coherent when evaluating applicants.

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