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Short Communication

Psychological distress and intelligence in young men

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ABSTRACT

This study has primarily aimed to investigate first, the prevalence of psychological distress complaints among a population-representative sample of young men, second, whether psychological distress is associated with poorer performance on an intelligence test and third, whether any association is a purely linear function. Specifically, we have examined self-reported symptoms of psychological distress, and IQ, among 1869 young men appearing before the Danish Draft Board with a view to assessing suitability for conscription. The assessment included a 25-item questionnaire concerning a broad range of distress-related items, the Personal Health Schema (PHS), having yes/no responses, together with a general IQ test, the Børge Prien's Prøve (BPP). The rate of endorsement of the PHS items was low, ranging between 3% and 29% with a median of two/three items. The Pearson correlation between the two variables was 0.15, but the relationship was better described by a model incorporating a negatively accelerating quadratic function and individuals above the 90th percentile on the PHS had a mean IQ of 94. This finding confirms the need to consider any general psychological distress, especially at high levels, when interpreting intelligence test scores.

1. Introduction

Historically, there has been extensive research into the associations between intelligence and a wide range of physical, medical, educational, employment, social and familial characteristics (Ritchie, 2015). However, there is also a growing body of evidence indicating that many psychiatric and psychopathological conditions are associated with below average intelligence (Urfer-Parnas, Mortensen, Saebye, & Parnas, 2010). In an extensive review, Martin, Burns, and Schonlau (2010) found limited but consistent evidence that 'gifted' youths have lower rates of anxiety than non-gifted. They also noted, however, the paucity of studies with adequate control groups and they were unable to find methodologically sound studies investigating other forms of psychopathology. More recently, in a large-scale study, Eklund, Tanner, Stoll, and Anway (2015) have found gifted children to have lower levels of teacher-rated emotional and behavioural disturbance. Conversely, Penney, Miedema, and Mazmanian (2015) found, among university students, positive associations between verbal ability and symptoms of general anxiety and depression, when measures of test anxiety were controlled for. Simple correlations, not partialling out test anxiety, were, however, not reported.

There has been a particular focus of attention on the relationship between test anxiety and test performance for which a meta-analysis derived mean correlation has been reported as 0.23 (Ackerman & Heggestad, 1997). Sommer and Arendasy (2015) note that there have been proposed two hypotheses to explain this relationship. Either it may be that individuals chronically prone to anxiety suffer an emotional interference in their cognitive test performance or that individuals who already have a cognitive deficit become anxious in test situations because of that very deficit. Sommer and Arendasy provide elaborate psychometric evidence to suggest that the latter is the case rather than the former.

Few studies in this area have been very large scale or representative of a general population. The objective of the present study has therefore been to examine the prevalence of psychological distress symptoms in a large and population-representative sample of subjects and the association between such symptoms and IQ test scores. Our primary hypothesis has been that, even within a normal population, higher levels of psychological distress would be associated with lower intelligence test scores. Secondarily, we consider whether any observed association is purely linear.

2. Method

2.1. Subjects

The subjects in this study were the 1869 young men who successively appeared before the Danish Draft Board at the regional centre of Høvelte Barracks, north of Copenhagen, in the period September through December 2014. Denmark maintains conscription into, currently, four months of military service for young men who become liable at the age of 18 and who then undergo a half-day assessment

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procedure. It should be emphasized that, owing to a shrinking need for large numbers of military recruits and an increasing rate of volunteering, in fact only about 10% of young men are actually called upon to perform military service involuntarily. The very large majority of men appear at the draft board at 18–19 years old. However, men who can document an illness or condition that would disqualify them from military service, e.g. chronic asthma, Scheuermann's disease and extreme myopia, are not required to appear before the board in person. Currently about 15–20% are so excused.

2.2. Instruments

The assessment day begins with the administration of a purpose-constructed paper-and-pencil 'psychological distress' form, the Personal Health Schema (PHS), which comprises 25 items listing negative feelings across a range of symptomatology. Responses are either Yes or No. The PHS was ultimately inspired by successors to Woodworth's pioneering Personal Data Sheet which was also developed for military use (Weiner & Greene, 2008) and in recent years the PHS has been modified several times. The questionnaire has not previously been the subject of published research and it is used clinically by an examining physician to give a broad indication of any distress.

Three of the 25 items were omitted as being inappropriate for the purposes of our study. One question concerned the use of medication but did not distinguish psychological purposes, e.g. tranquilizers, from somatic medications, e.g. inhalers for asthma. Two other questions were omitted as being specific to the situation of being called upon to perform national service; one concerned eating in unfamiliar places and the second concerned difficulties accepting authority. The final 22 items that were used in this study are listed in Table 1.

Immediately following completion of the PHS, the next part of the procedure is an assessment of cognitive ability, namely Børge Prien's Prøve (BPP) (Teasdale, 2009). The BPP was first introduced in the early 1950′s and has remained unchanged to the present day with the exception that in 2010 it was converted from a paper-and-pencil test to a computer-administrated one. There are 78 items, distributed across four subtests of, respectively, matrix reasoning, verbal analogies, number series and geometric figures. None of the tests are multiple-choice. Only the total score (0–78) is recorded and neither individual items nor subtest scores are available.

The BPP has been found to correlate highly ($r = 0.82$) with the Wechsler Adult Intelligence Scale test (Mortensen, Reinisch, & Teasdale, 1989) and there has been reported a correlation of 0.57 between the BPP and the Raven's Advanced Progressive Matrices among 689 recruits selected for high educational levels (and therefore with restricted range) (Teasdale, Hartmann, Pedersen, & Bertelsen, 2011). In our sample the mean BPP score was 41.38 (SD = 8.60) which is very close to that of the most recent national data available where the computer version of the test has been used, namely autumn of 2010, where the mean BPP was 41.35 (SD = 8.74, $n = 8744$). This indicates that there is no selection bias in our current sample with respect to intelligence.

The BPP yielded a distribution very close to normal with only modest (negative) skewness and negligible kurtosis, and for present purposes we have transformed the raw scores linearly into IQ scores with a mean of 100 and a standard deviation of 15.

3. Results

The rates of positive responses to the 22 items of the PHS were generally low (see Table 1) ranging from question 5 "Are you often very tired?" (29%) to question 21 "Do you often have difficulties getting along with other people?" (3%). Eight of the items were endorsed by fewer than 10% of subjects and over half of all men in the study endorsed no items or at most one item.

Scree plot inspection of a Principal Component Analysis revealed only the presence of a single first component accounting for 19% of the variance. It is noticeable that the four heaviest loadings on this component were questions clearly related to anxiety. See Table 1, questions 2, 10, 18 and 22.

We calculated a Total PHS score adding the scores for all 22 items, thus yielding a score range of 0 to 22. This Total PHS score had a reliability (Cronbach's Alpha) of 0.80 and all 22 items correlated positively and significantly with the total score (range 0.24–0.48, $p < 0.001$). The distribution of total scores was pronouncedly positively skewed, with 24% of men having a score of zero and only 10% having a score >6.

The simple Pearson's (linear) correlation between IQ and the PHS total score was 0.15. Fig. 1 shows a scatterplot of the association

Table 1
Frequency distributions and Principal Component loadings for the 22 PHS items ($N = 1869$).

	Question	% responses	PC loading
1	Do you often have difficulties concentrating?	19.4%	0.48
2	Do you often feel tense and nervous?	11.5%	0.60
3	Do you often have problems sleeping?	20.3%	0.48
4	Do you often become afraid for no real reason?	3.2%	0.39
5	Are you often very tired?	28.8%	0.49
6	Do you often experience pain, e.g. in your head, neck, or back?	22.2%	0.38
7	Are you often influenced by panic?	18.7%	0.39
8	Do you often have difficulty controlling your temperament?	12.2%	0.36
9	Do you often get cold sweats?	4.3%	0.43
10	Are you often worried or anxious?	11.1%	0.53
11	Do you often get dizzy?	4.7%	0.29
12	Are you more distracted by noise than other people?	10.9%	0.42
13	Do you suffer from mood swings?	7.8%	0.45
14	Does your heart often beat quickly for no particular reason?	6.3%	0.35
15	Do you feel unwell?	6.4%	0.42
16	Do you have difficulty getting friends?	4.8%	0.36
17	Do you prefer to be alone?	16.2%	0.44
18	Do you often have bothersome thoughts?	10.6%	0.51
19	Are you very shy?	13.9%	0.38
20	Do you often feel that others misunderstand you?	13.8%	0.47
21	Do you often have difficulties getting on with others?	2.6%	0.44
22	Do you easily become unsure of yourself?	18.8%	0.50

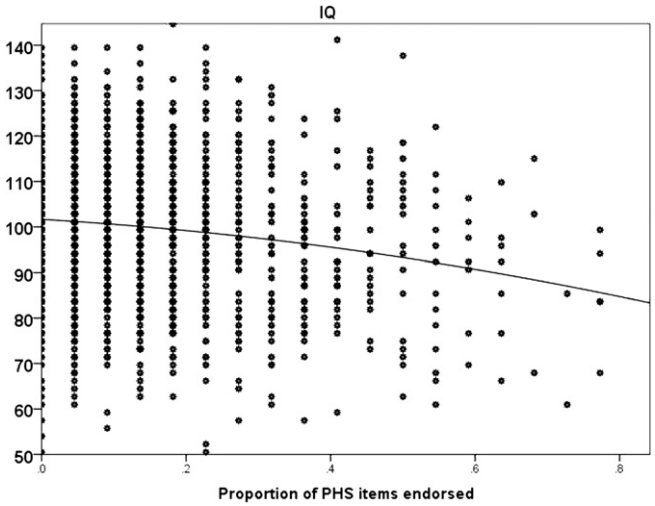

Fig. 1. Scatterplot of IQ in relation to number of PHS Endorsed Items.