Detecting Talent: A Student Checklist for Identification of Giftedness and Talent

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Abstract

In many schools there will be highly gifted students who need a challenge, but are unidentified by their teachers. Thus early identification and intervention is necessary for optimal development. However, many intelligence tests are time-consuming and costly. In this paper, a brief and easy-to-use screening instrument is presented. This checklist is a self-report, single page, paper-and-pencil questionnaire comprising 25 items, that can be completed quickly by the student. Each item is unipolar and asks the respondent about the match between a listed character trait and the student's self-perception on a 3-point scale: 0 (not true), 1 (somewhat or sometimes true), and 2 (very true or often true). A comparative validity study was conducted on a group of 91 students with an IQ score between 130 and 160 (*M*=142) and group of 42 'ordinary´ students with an IQ between 84 and 116 (*M*=103). In advancing the practical application of the Giftedness checklist a set of cut-off intervals for identification of gifted students were identified using the total score on the gifted checklist. Using the intervals enables the teacher to determine the probability of giftedness based on raw scores. The checklist is available as an application.

Keywords

Screening; Giftedness; Checklist; Measurement instrument; Norms; Validity

Introduction

The terms *gifted* or *gifted and talented* are bestowed students who display a variety of characteristics, including high performance capabilities in an intellectual, creative or artistic area (Clark, 2008). Although certain characteristics can be generalized some gifted students may not possess the same characteristics as other gifted individuals and they may not appear to have the same observable differences. Depending on how their giftedness previously has been dealt with, they even may appear quite "ungifted". Many gifted students resist routine and exhibit nonconformist behavior. Others may withdraw, and passively be doing a minimum of what is required. These students may have developed an undesirable behavior due to lack of challenges in school being more or less arrested in their intellectual development (Clark, 2008; Nissen, Baltzer, & Kyed, 2007). Therefore, it is important to identify these students as early as possible in order to secure a positive schooling experience.

There is no universal definition on giftedness, but many professionals define *gifted* as an intelligence score above 130, two or more standard deviations above the norm, or the top 2.5 % (Wasserman, 2003; Wechsler, 1991). In spite of many limitations, measures of intelligence remain the most common and effective way by which students can be identified as intellectual gifted (Wasserman, 2003). However, intelligence tests are often long and demanding on respondents. As a result, using intelligence tests can be a time consuming and expensive task if they are performed on many students.

This paper describes the development and validation of a brief and easy-to-use screening instrument for gifted students. We intended to develop a tool that is psychometrically sound, inexpensive and quick in practical use, one that would be accepted by students, parents and teachers, and of sufficient simplicity to be accessible to most students. The Giftedness checklist is a self-report, single-page, paper-and-pencil questionnaire with 25 items that can be quickly and easily completed by a student. Each item is unipolar and asks the respondent about the match between a listed character trait and the student's self-perception on a 3-point scale: 0 (not true), 1 (somewhat or sometimes true) 2 (very true or often true). The purpose of the validation study is twofold: First, we wish to determine the internal reliability and validity of the checklist. Second, we wish to determine the optimal cut-off threshold for the successful determination of gifted students.

Method

There is a vast body of literature on characteristics of gifted students (Clark, 2008; Davis, 2003; Silverman, 1984, 2009) and several internationally checklists have been produced, e. g. Silverman's checklist (1984), but using American norms to identify gifted students in a Danish context should not be done uncritically. Based on theoretical work on giftedness (Clark, 2008; Neihart, 1988; Shavinina, 2009) and clinical experience with checklists (Clark, 2008; Silverman, 1984) in research projects (Baltzer & Nissen, 2011; Nissen & Baltzer, 2011) a 56-item unipolar was developed[1]. This checklist was administered with two groups of students. One group of 91 students were selected from the Danish Association of Gifted Children with an IQ score (WISC-III) (Wechsler, 1991) between 130 and 160 (M=142) – the Gifted Children Group. The other group – referred to as ordinary students in the article – consisted of 42 students with an IQ between 84 – 116 (M=103) and who were enrolled in a program for mostly school motivated underachievers from various schools that need new and increased challenges in their schoolwork.

School psychologists administrated the WISC-III to the gifted students and the results were subsequently provided the authors. The ordinary students were tested by means of the Giftedness checklist and Reynolds Intellectual Screening Test (RIST), a screening instrument that highly

[1] The choice of a unipolar scale also reflects the priority awarded feasibility, as it is less mentally taxing for the respondent to consider one attribute rather than balancing two opposing attributes in relation to their self-perceived characteristics. Moreover, bipolar scales usually require five or seven answers categories to enhance validity, which again is more taxing on the respondent.

correlates with the WISC-III (Reynolds & Kamphaus, 2004). The resultant data from both groups were merged into one dataset and analyzed with SPSS 19.0 for Windows.

Results.

The aim of the validation study was both to determine the reliability and validity of the Giftedness checklist and to determine the optimal cut-off threshold (e.g. specific value or interval) for the identification of gifted students using the checklist. Accordingly, the validity analysis involved an examination of the predictive value of the individual items on the total score (to identify a set of 25 items for the checklist), a Cronbach's Alpha test of the selected 25 items for determining internal reliability, as well as a correlational analysis of Giftedness checklist scores and IQ scores as a test of criterion-related validity. Finally, the optimal screening threshold for the identification of gifted students was identified through on a comparison of giftedness checklist scores between gifted and ordinary students and an analysis of sensitivity and specificity of the giftedness checklist.

Descriptive statistics

Of the 133 students - 91 gifted students and 42 ordinary students – 61,7 % of the students were males and 38,3 % were females. The mean age was 11,2 years (SD=2.7, range=6-17). All students were Danish speaking. No statistically significant differences in age or gender were identified between the two groups (p. <.01). Table 1 shows sample characteristics.

Table 1: Sample characteristics

	Count	%
Ordinary students	42	31.6
Gifted students	91	68.4
Male	82	61.7
Female	51	38.3
Total	133	100.0

	Mean	Maximum	Minimum	Standard Deviation
Age	11.23	17.00	6.00	2.73

The average giftedness checklist scores based on the 25 items are presented in Table 2 for both the ordinary and the gifted students. The table shows that gifted students with a mean score of 36.5 tend to have higher giftedness checklist scores than ordinary students with a mean score of 25.2; though, the standard deviations for these means do indicate some overlap in mean scores across the two groups. Correspondingly the range of scores indicates overlapping score-ranges between 23 and 38.

Table 2: Giftedness checklist scores (25 item)

	Range of scores (0-50)	Mean	SD	Median	Mode
Ordinary students	9–38	25.2	5.52	25	25
Gifted students	23-48	36.5	5.99	36	34

Item analysis

The purpose of the item analysis is to determine a set of items that collectively form an internally consistent checklist, implying that the items collectively measure the same underlying construct (Spector, 1992). The 25 items for the Giftedness checklist were selected from the 56 sample items administered to the students by examining the predictive value of each of the items with the total score of all 56 items. The 25 items were selected for further validation analysis are listed in table 3.

Table 3. Internal consistency

	Item-Remainder Coefficient	Cronbach's Alpha if Item Deleted
1. I learn rapidly.	.324	.859
2. I have an excellent memory.	.364	.858
3. I am sensitive.	.250	.862
4. I am very curious and know many things.	.479	.855
5. I am a keen observer.	.503	.854
6. I am highly creative.	.271	.861
7. I am good at understanding complex relations.	.445	.856
8. I prefer companions with similar interests.	.461	.855
9. I feel different from companions my own age.	.354	.859
10. I speak differently from companions at my age.	.486	.854
11. I have a different sense of humor than others at my own age.	.428	.856
12. I feel bored in class.	.551	.852
13. I don't like routine work in class.	.493	.854
14. I think differently than others at my own age.	.501	.854
15. I often hide my abilities.	.087	.868
16. My school is not doing enough for me.	.507	.853
17. I know I am smart and skillful.	.342	.859
18. I learn new stuff easily.	.346	.859
19. I am bored in school because it is too easy.	.581	.850
20. I like to develop systems and codes.	.495	.854
21. I don't spend much time on school work.	.599	.850
22. I am good at constructing and imagining things.	.308	.859
23. I am good at technical things (e.g Techno Lego).	.391	.857
24. I am good at advanced games (e.g. computer games).	.372	.858
25. I often make judgments that are mature beyond my age.	.449	.856
Coefficient Alpha = .862		

Table note: N=121

The internal consistency of the Giftedness checklist was examined by the item-remainder coefficient of the individual items in tandem with Cronbach's Alpha for the 25 items collectively. The item-remainder coefficient is the correlation of an item with the sum of the remaining items in the checklist (Spector). The coefficients for the 25 items range from .087 to .599, with most items indicating acceptable and moderate correlations in the range of .300 - .480, as showed in table 3.

Cronbach's Alpha compares the variance of the total checklist score (sum across all 25 items) with the variances of the individual items. The Cronbach's Alpha for a checklist is usually positive and range from 0 to just under 1 and an Alpha level of .70 or higher is generally accepted as an indicator of high internal consistency (Spector, 1992). Cronbach's Alpha for the 25-itemchecklist is sufficiently high .862, indicating that the 25 items collectively measure the same underlying construct. Moreover, the internal consistency can only be improved by the removal of the item 'I often hide my abilities', but the estimated increase in Alpha-level is minimal. Informed by clinical experience, we decided to keep the item in thechecklist as the item still holds an explanatory value in interpreting student scores.

Criteria-related validity

The criteria-related validation of the giftedness checklist was performed as a correlational analysis between Giftedness checklist scores and IQ scores. A Pearson product-moment correlation coefficient was computed to determine the strength of relationship. Table 3 shows the results. The analysis indicates a significant and moderately strong positive correlation (r = .627, p = .000) between the Giftedness checklist scores and the IQ scores, meaning that high scores on the Giftedness checklist tend to be paired with relatively high scores on the intelligence test. This suggests that the Giftedness checklist score is a relatively strong predictor of IQ scores see table 4.

Table 4. Correlation between Giftednes scores and IQ scores

		Giftedchecklist Score	IQ Score
Giftedchecklist Score	Pearson Correlation	1	.627**
	Sig. (2-tailed)		.000
	N	121	73
IQ Score	Pearson Correlation	.627**	1
	Sig. (2-tailed)	.000	
	N	73	80

Table note: **. Correlation is significant at the 0.01 level (2-tailed). N= 38 ordinary children and 32 gifted children.

Cut-off scores.

In advancing the practical application of the Giftedsness checklist, we then identified two different types of possible cut-off scores for the identification of gifted children using the checklist:

1. A set of cut-off intervals for the identification of gifted children using the total score on the Giftedness checklist
2. A cut-off threshold for the identification of gifted children using the number of items with a value of '2'.
3.

The cut-off intervals on total scores were determined by examining a scatter diagram of the children's Giftedchecklist and IQ scores. The scatter diagram below presents gifted students (green markers) and ordinary students (blue markers) arranged by their respective giftedness checklist and IQ scores. The scatter diagram (figure 2) indicates three possible intervals for the Giftedness checklist score:

Under 25: Very Low probability of giftedness (roughly 5 % probability of being gifted)
25-30: Low probability of giftedness (roughly 33 % probability of being gifted)
30-35: Medium probability of giftedness (roughly 40 % probability of being gifted)
Over 35: High probability of giftedness (roughly 95 % probability of being gifted)

Depicted in figure 1.

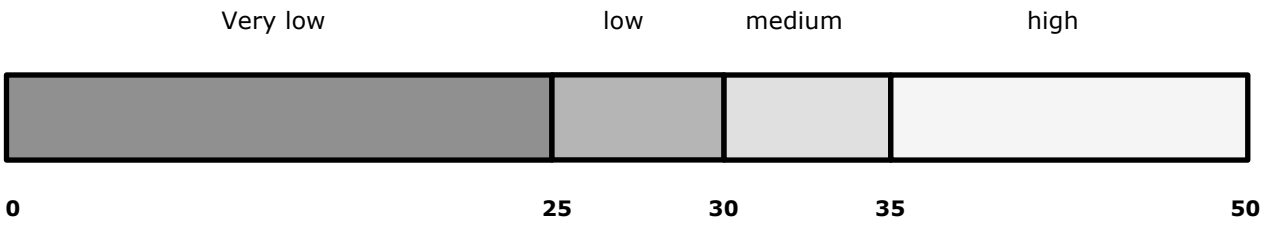

Figure 1. Probability of giftedness based on raw scores

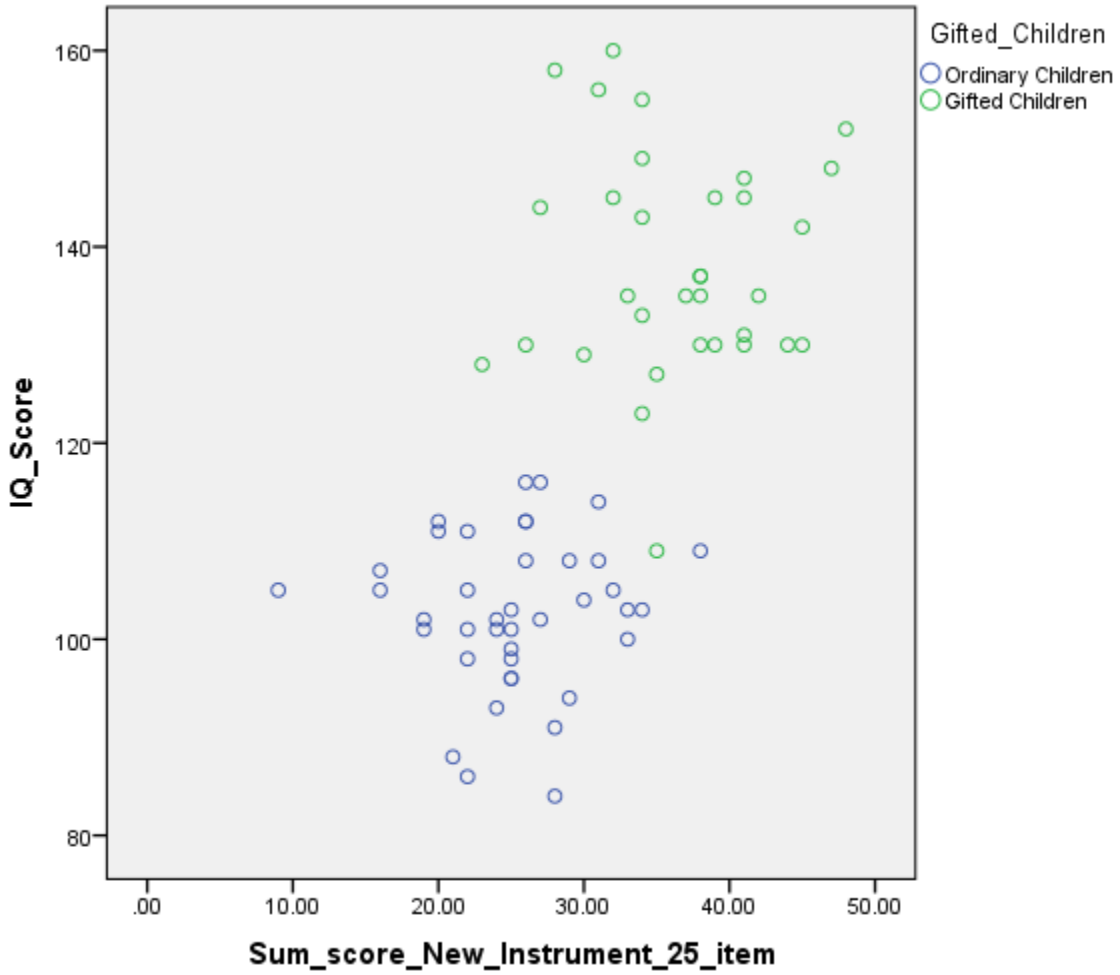

Figure 2: Scatter diagram of Giftedchecklist total scores and IQ Score (N= 38 ordinary children and 32 gifted children)

We then analyzed the sensitivity and specificity of the instrument in order to determine an appropriate cut-off frequency of the number of items that gifted students responded high agreement with (indicated by value '2' on the Giftedness checklist). The results of the analysis are presented in Figure 3 below. The x-axis of the diagram represents the possible numbers of items with the value "2" that can be required to identify a gifted student. The y-axis provides the percentage of students that are correctly identified as either gifted or ordinary. Specificity refers to the proportion of actual negatives (ordinary students), which are correctly identified as ordinary (for each of the possible cut-off thresholds on the x-axis). Sensitivity is the proportion of actual positives (gifted students), which are correctly identified as such (for each of the possible cut-off thresholds on the x-axis).

Ideally, the appropriate cut-off threshold balances sensitivity and specificity. As just one example, using a cut-off of 4 items or more with a value '2' would correctly identify 100 % of the gifted

students as gifted students (high sensitivity), while at the same time identifying merely 34 % of the ordinary students as ordinary students (low specificity). Conversely, using a high cut-off threshold of 15 or more items with a value of "2" as a norm only identifies 16 % of the gifted students as gifted students (low sensitivity), while correctly identifying 100 % of the ordinary students as ordinary students.

In examining the sensitivity and specificity diagram, we suggest a cut-off threshold of 10 items with a value of '2', meaning that any child assigning a value of '2' to ten or more items is likely to be gifted. This threshold correctly identifies 87.9 % of the gifted students as gifted students, while identifying 74 % of the ordinary students as ordinary students.

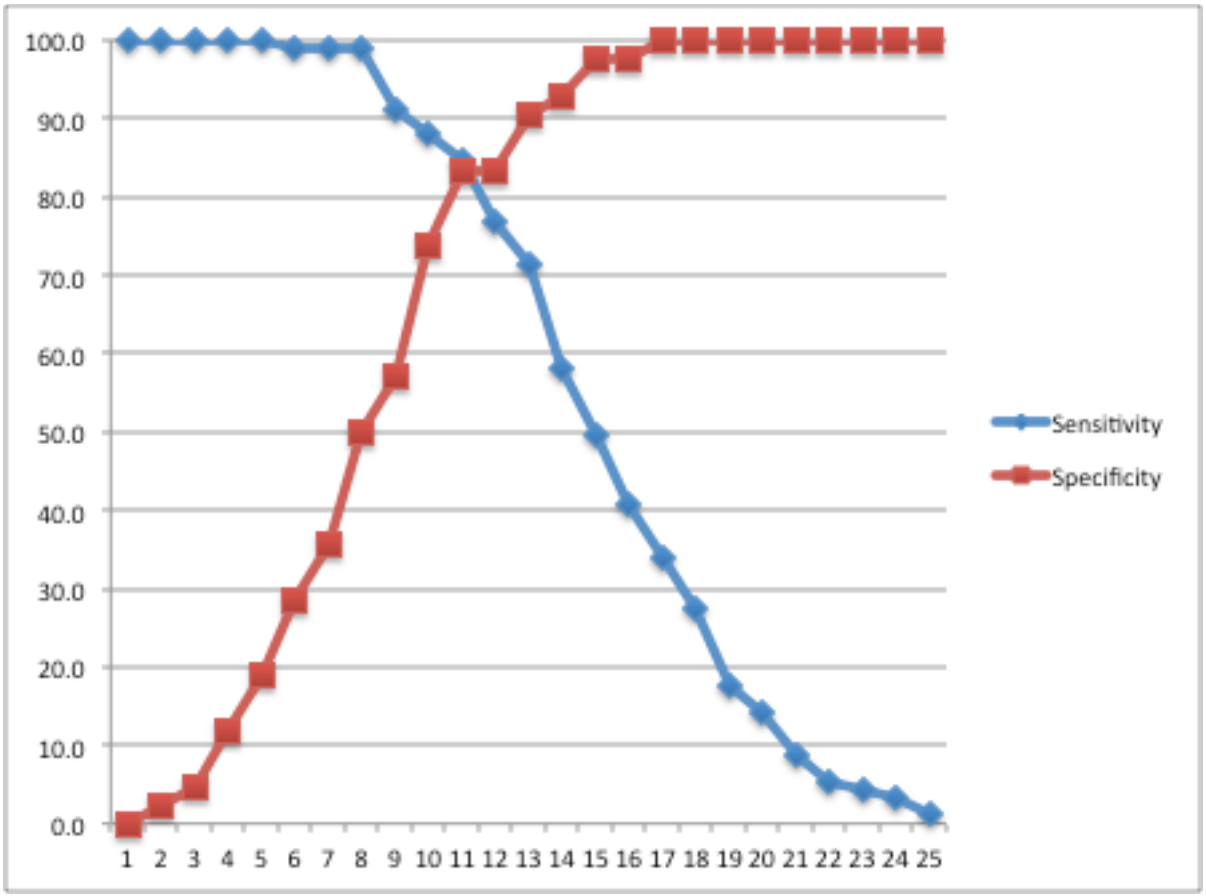

Figure 3: Sensitivity and specificity diagram (N=121)

Discussion

Limitation of the study

All the children in the Gifted Children Group were tested with WISC-III intelligence test but for practical reasons it was not possible to expose the 'Ordinary Group' to the same test. On that background a brief intellectual screening test RIST was used. This test has been shown to correlated highly with the WISC-III (Reynolds & Kamphaus, 2004) and like the WISC-III it has Danish norms.

Implications and future research needs

In summary, the validation study indicates that the Giftedness checklist could function as valid and feasible screening instrument for initial identification of gifted children. The checklist is internally consistent and serves as a relatively good predictor of IQ scores. Our study has several practical implications. The Giftedness checklist is quick and easy to use in a classroom, and demands little time and effort from the respondents. Moreover, two different types of norms can be applied in score interpretation by parents as well as teachers or other practitioners. We suggest using the Giftedness checklist as a pretest before advancing more resource-demanding IQ tests assessment models (Nissen, 2011).

The analysis indicate that the Giftedness checklist needs of further practical application and validation studies. This is only natural, as the present validation study is the first of its kind for the Danish Giftedness checklist.

One area of potential research includes retesting the Giftedness checklist to establish the test-retest reliability of the. This type of validity evidence would indicate the reliability or robustness over time and is the logical next step in examining the properties of the checklist.

Another area of further study would be the Giftedness checklist's ability to discriminate between different categories of Gifted Students. Further analysis of patterns in the score profiles of gifted students with exceedingly high or low scores would likely improve future score interpretation and usage of the checklist. Likewise, administration of the test to other samples would also allow for validity analyses on specified class levels or age groups.

The results of our study also have several practical implications. Practitioners who seek to employ the Giftedness checklist to identify gifted students should consider the two types of norms and the associated risks with these. Screening for giftedness and identification of gifted students have important practical implications, because the students' further testing and schooling will be influenced by their performance on the Giftedness checklist. As such, future research on consequential validity may be in place. Consequential validity is the extent to which adverse consequences result from flaws in the measurement instrument. In the Giftedness checklist there

are two types of errors that may result in adverse consequences: the false positive (identifying an ordinary student as gifted) and the false negative (identifying a gifted student as ordinary). The false positive may result in ordinary students undergoing demanding IQ tests only to be identified as ordinary students later. Conversely, the false negative may result in gifted students not being identified as such and being hindered in not developing their talent. Both consequences are relevant to consider and examine in further validation studies. We further note that the validity evidence pertaining to consequential validity may not be exclusively quantitative; in fact, much of the evidence can be in the form of verbal statements or even observations. We recognize that the process of consequential validation is arduous and that developing and gathering the necessary evidence can be a time-consuming undertaking. However, as we mentioned earlier, the need for consequential validity evidence is particularly compelling given the intended use of the screening instrument.

In conclusion, we find that the Giftedness checklist stands out because of its brevity and its development grounded in theory and clinical practice (where it is intended to be implemented). It is our modest hope that the Giftedness checklist will be further tested in practice.

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