

Intellectual Abilities of Blind and Partially Sighted Children

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Visually impaired children in Lithuania

- ~ 600 school age visually impaired children;
- Nearly a half mainstreamed:
 - 9 blind
 - >250 partially sighted (10% of this population have visual acuity <0,1).

Education of visually impaired children in Lithuania

2 main institutions for special education (with boarding schools and dormitory)

Admission – medical diagnosis and report of visual acuity less than 0,3:

- Lithuanian Training Centre for the Blind and Visually Impaired
- Kaunas County Training Centre for the Blind and Visually Impaired

There are also Vision Development Centers in Klaipėda, Šiauliai and Panevėžys cities

Background for the study

Theoretical importance:

- Insight to the structure of intelligence of visually impaired children.
- Insight to the role of vision in the development of a child's cognitive abilities.
- Little is known about the Haptic intellectual abilities of blind children.

Background for the study

Practical importance: test selection and adaptation.

- No studies of the performance of Lithuanian visually impaired children on WISC-III subtests
- No guidelines for test use, modifications, subtest choice and interpretation:
 - Inadequate report of Full Scale IQ
 - Report of learning disabilities based on observations of poor performance on visual items
- Need for assessing tactual abilities

The study:

Two aspects:

- Implications for test use:
 - Psychometric data about the ITVIC test: reliability and validity;
 - Equivalence of the WISC-III for the blind, partially sighted and normally sighted, validity of IQ's;
- Intelligence structure of the blind, partially sighted and normally sighted is compared:
 - Strengths and difficulties;
 - The importance of environmental and visual acuity factors for intellectual functioning of blind and partially sighted children.

The ITVIC – Intelligence Test for Visually Impaired Children

- Developed in The Netherlands (Dekker et al., 1990)
- Based on Thurstone (1938) intelligence theory
- For Braille educated children
- 5 verbal (two from WISC) and 8 haptic subtests
- Two types of age norms: for all Braille educated children and separate age norms for two vision groups

ITVIC Verbal scale:

Subtest	Abilities measured
Vocabulary (WISC-III)	Word knowledge and verbal expression
Digit Span (WISC-III)	Working memory
Learning Names	Associative memory
Verbal Analogies	Inductive reasoning.
Fluency	Ideational fluency

ITVIC Haptic scale

Subtest	Abilities measured
Exclusion	Reasoning: finding correct classification rule
Figural analogies	Inductive reasoning
Perception of objects	Accurate perception
Perception of figures	Precise perception, calls on memory
Block design	Spatial perception, motor skills are important, memory
Rectangle Puzzles	Spatial perception, motor skills play a role
Map Questions	Spatial perception, ability to manipulate mental representations, memory.
House Plan Questions	Ability to verbalize spatial representations, memory.

Adaptation of the ITVIC

- Agreement between Bartiméus Centre and Vilnius university;
- Translation of test instructions and items;
- Adaptation of culturally biased items for Lithuanian children (tested with partially and normally sighted);
- Validation study: reliability analysis, item analysis, comparing means of subtests scores of Lithuanian and Dutch samples, factor analysis.

Participants

	Blind (visual acuity < 0,04)	Partially sighted (visual acuity <0,3)
Boys	26	18
Girls	16	10
Total	42	28
Age	7-16	8-16
Mean age	12,45	12,32

ITVIC reliability and validity

ITVIC is a reliable and valid instrument for the assessment of intellectual abilities of Lithuanian blind children:

- Cronbach α range from 0,56 (House Plan Questions) to 0,94 (Rectangle puzzles)
- Item difficulty: median p values range from 0,45 (Block Design) – 0,7 (Verbal Analogies)
- Item discrimination: mean discrimination indexes 0,22 (Rectangle Puzzles) – 0,79 (Block Design)
- Poor content validity of House Plan Questions

Means of subtests scores of Lithuanian and Dutch samples of children without usable vision aged from 12,5 to 16 years

Subtest	Age > 150 mnths		
	Lithuanian N=18	Dutch N=38	Significance (p)
Verbal analogies	18,8	21	0,15
Figural analogies	14,9	16,9	0,35
Subtest	Age > 163 mnths		
	Lithuanian N=15	Dutch N=33	Significance (p)
Perception of figures	21	22,4	0,24
Fluency	60,9	66,9	0,3
Exclusion	17,33	18,7	0,47

Means of subtests scores of Lithuanian and Dutch samples of children without usable vision aged from 12.5 to 16 years

Subtest	Age > 163 mnths		
	Lithuanian N=15	Dutch N=33	Significance (p)
Map Questions	23,1	26,7	0,03
House Plan Questions	5,9	7	0,02
Rectangle Puzzles	81,9	92,6	0,06
Learning names	18,1	21,9	0,03
Block design	6,5	8,6	0,08

Conclusion

The Dutch norms for 7 ITVIC subtest can be used for the assessment of intellectual abilities of this age group of children without useful vision

Factor structure of the ITVIC

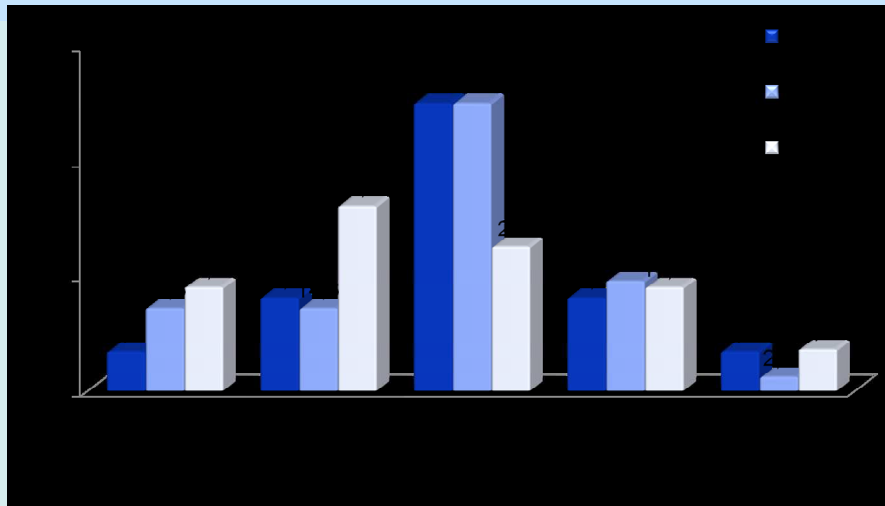
Dutch version:

- Orientation (ability to orient oneself in space),
- Reasoning (verbal and haptic),
- Spatial ability (spatial reasoning, motor, speed components)
- Verbal ability.

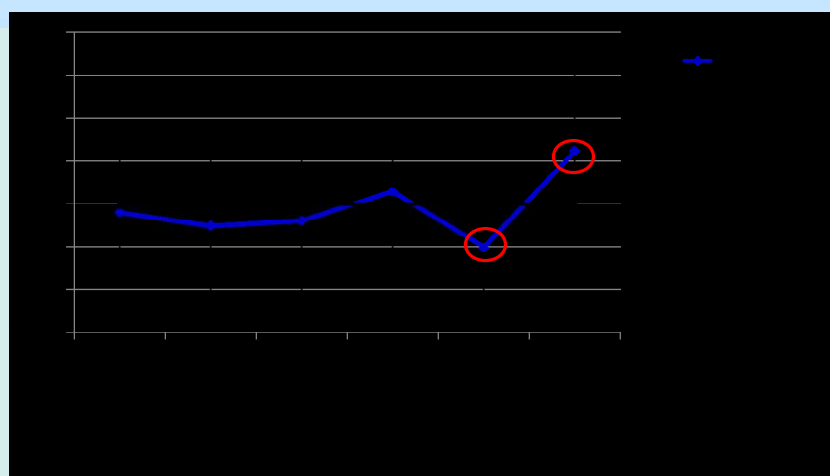
Lithuanian version:

- Haptic ability,
- Memory,
- Verbal ability.

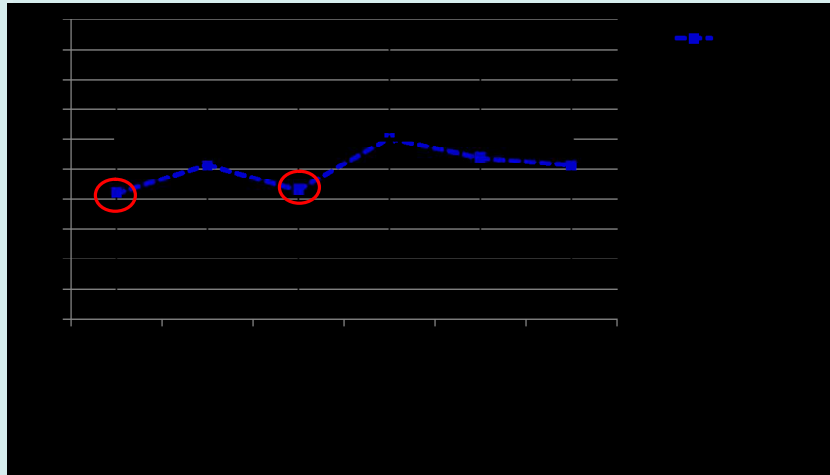
Distribution of WISC-III Verbal Scale IQ



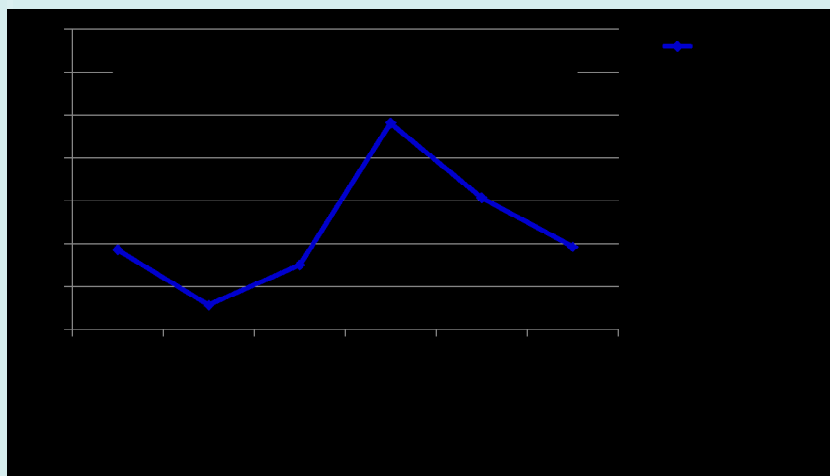
Means of the WISC-III Verbal subtests (Scaled M=10, SD=3): Blind children



**Means of the WISC-III Verbal subtests
(Scaled M=10, SD=3): Partially sighted
children**



**Means of WISC-III Performance subtests
for the Partially sighted group**



Possibilities of using WISC-III with VI children

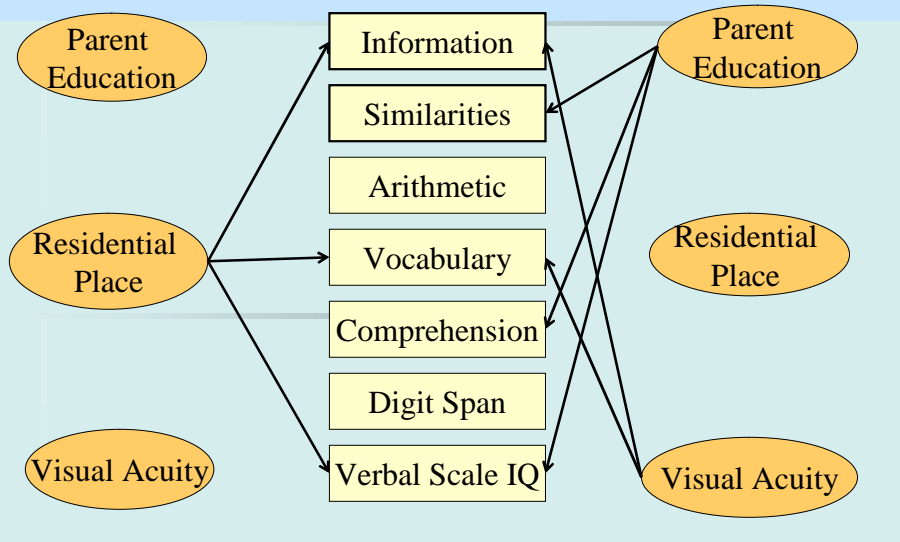
- Verbal scale is a valid measure of blind and partially sighted children's intelligence;
- Verbal Comprehension and Freedom from Distractability indexes should not be interpreted (they are not valid);
- Comprehension subtest: exclude the score from IQ? Not to use cut off rule?

Intelligence structure of blind and partially sighted children

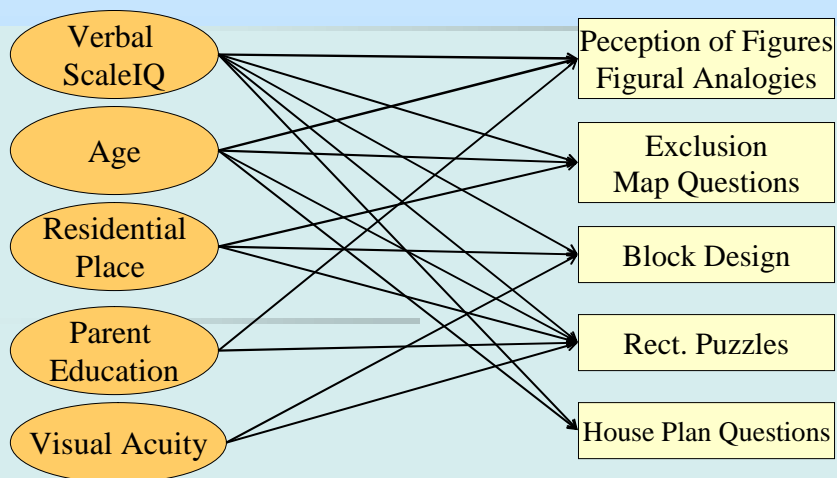
- Verbal intelligence is comparable between blind, partially sighted and normally sighted children.
- Blind children:
 - Superior auditory short term memory of blind children;
 - Worse reasoning about practical situations;
 - Haptic abilities (especially accuracy of haptic perception, spatial analysis and speed) are the most important abilities in blind children's intelligence structure.

Predictors of the WISC-III Verbal Scale scores:

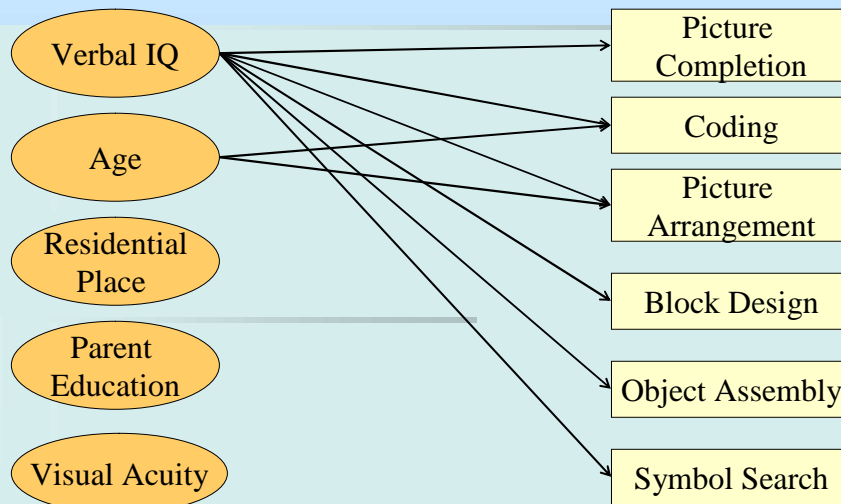
left – blind; right – partially sighted



Predictors of the ITVIC Haptic Scale Scores



Predictors of WISC-III Performance Scale Scores



Conclusion

- Parental education and of residential place are the most important predictors of blind and partially sighted children's Verbal abilities.
- Verbal intelligence is the best predictor of the haptic performance
- Visual performance of partially sighted children can be best predicted by Verbal intelligence (not by visual acuity)

- Questions?