EXPLORING THE MYTHS

The relationship between everyday life difficulties and standardised visual perceptual assessment results in children referred to OT with DCD or related conditions.

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Visual perception?

- or
Definitions of visual perception

• ‘Visual perception is largely recognised as the intermediate step in information processing between sensation and cognition. It is a rapid, automatic, unconscious process’ (Martin et al, 2010, Hammill, et al, 1993).

• Visual perception is defined as ‘a group of visual cognitive skills used for extracting and organising visual information from the environment’ (Scheiman, 2011).

• Visual perception is “the total process responsible for the reception and cognition of visual stimuli” (Schneck, 2001)

Design of Study

• Descriptive correlative research design
• Development of Children’s Visual Behaviour Checklist (CVBC) to measure the children’s functional difficulties in all areas of Occupational Performance.
• Comparison of functional difficulties between this clinical group and a typically developing sample (TDS) using the CVBC.
• Relationship between these difficulties and results of the Test of Visual Perceptual Skills 3rd Edition (TVPS-3) (Martin 2006) in clinical sample.
• Discussion and implications for practice
Research Questions

• Are there differences in reported functional difficulties identified by the CVBC between a clinical sample of children referred for OT assessment and a cohort of typically developing children?

• Are there relationships between the CS’s functional difficulties as measured by the CVBC and the results of the TVPS-3?

• What implications will the findings have for clinical practice?

Literature Review:

Theoretical constructs of visual perception (VP):

• Two main areas of visual perception:
  • Perception of form (including colour), Temporal lobe
  • Perception of space and motion, Parietal lobe

• Perception of Form: Visual discrimination (including figure ground and visual closure)

• Perception of space and motion: Depth perception, position in space, way-finding, laterality and directionality

Literature Review:
Visual Perception as described by TVPS-3:

- Seven discrete areas: Visual Discrimination, Visual Memory, Spatial relationships, Form constancy, Sequential memory, Figure ground, Visual closure.

- Cite Chalfant and Scheffelin’s document (1969) as source for this categorisation.

- Chalfant and Scheffelin describe two main classes of VP; ocular motor skills and cognitive skills necessary for the analysis and synthesis of visual information. They discuss visual cognitive tasks under three major groupings, spatial relationships, visual discrimination and object recognition. Time for visual processing also important.

Literature Review:
What are we measuring?

- Salvia and Ysseldyke (1991) state that
  - ‘What the majority of the research has shown is that most perceptual-motor tests are unreliable. We do not know what they measure, because they do not measure anything consistently……for the most part they are neither theoretically nor psychometrically sound’.


- Relationship to academic attainment poor (Coté, 2011, Richmond and Holland, 2010, Tseng and Chow, 2000)

- Lack of research to examine relationship to other areas of occupational performance
Literature Review:
OT practice in area of Visual Perceptual assessment
• Frequently not following practice guidelines described in textbooks

• TVPS among standardised assessments most widely used by OTs internationally


• Risk in using bottom up assessments if practitioner fails to connect the foundational factors to occupational performance (Weinstock-Zlotnick and Hinojosa, 2004)

• OTs frequently under pressure to use standardised measures for the following reasons:
  • Concrete measuring of abilities pre and post intervention
  • Outcome measure demonstrable to parents and other professionals
  • Support clinical observations
  • Accountability and reporting of assessment findings (Howard, 2002)

Method: Development of the CVBC

• Compiled list of observable behaviours

• Working group drafted into first version covering all areas of occupational performance

• Member checking process was completed

• Pilot on 5 CS and 5 TDS

• CVBC finalised. 50 questions. Includes parent section covering self care and play/leisure and teacher section covering general school skills, reading, maths and writing skills.

• Likert style scoring, 'not like, sometimes like, often like, always like this child'.
Method: Choice of TVPS-3:

- Most frequently purchased test of VP skills on the Irish market (ETC, 2012)
- Researcher’s questioning of clinical usefulness of this measure.

Method: Clinical sample selection and data collection

- Convenience sample of 30 children.
- Enrolled in West Cork Paediatric OT service.
- Without diagnosed neurological or intellectual disability.
- No uncorrected visual or hearing loss.
- Still attending primary school.
- Recruited by sending out information and consent/assent forms to children currently receiving OT intervention.

- Data was collected at a clinic appointment where the TVPS-3 was administered by an experienced paediatric OT. The parents completed the CVBC which was then sent to the child’s teacher to complete.
- Other clinical observations and ocular motor control screening were also carried out.
Method:
Typically developing sample selection and data collection

- 30 children matched by age and gender were recruited from local schools.
  - Performing within the average range on standardised school tests.
  - No diagnosed disabilities, conditions or visual impairments.

- Information and consent forms sent to school principals.
- CVBC sent to those who returned consent forms.
- Class teacher completed teacher section.
- Anonymised CVBCs were returned to the researcher.

Results: CVBC scores for CS and TDS; independent samples t-test

Table 1: Mean and std. deviations for CVBC scores for CS and TDS.

<table>
<thead>
<tr>
<th>Area</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>Std error mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self care</td>
<td>Clinical Sample</td>
<td>30</td>
<td>13.67</td>
<td>7.097</td>
<td>1.296</td>
</tr>
<tr>
<td></td>
<td>Typically developing sample</td>
<td>30</td>
<td>1.43</td>
<td>1.675</td>
<td>0.306</td>
</tr>
<tr>
<td>Play / leisure</td>
<td>Clinical Sample</td>
<td>30</td>
<td>10.07</td>
<td>5.717</td>
<td>1.044</td>
</tr>
<tr>
<td></td>
<td>Typically developing sample</td>
<td>30</td>
<td>0.87</td>
<td>1.306</td>
<td>0.238</td>
</tr>
<tr>
<td>General school</td>
<td>Clinical Sample</td>
<td>30</td>
<td>8.10</td>
<td>5.067</td>
<td>0.925</td>
</tr>
<tr>
<td></td>
<td>Typically developing sample</td>
<td>30</td>
<td>0.90</td>
<td>2.249</td>
<td>0.411</td>
</tr>
<tr>
<td>Reading skills</td>
<td>Clinical Sample</td>
<td>30</td>
<td>5.90</td>
<td>4.436</td>
<td>0.810</td>
</tr>
<tr>
<td></td>
<td>Typically developing sample</td>
<td>30</td>
<td>0.57</td>
<td>1.478</td>
<td>0.270</td>
</tr>
<tr>
<td>Maths skills</td>
<td>Clinical Sample</td>
<td>30</td>
<td>8.00</td>
<td>4.251</td>
<td>0.776</td>
</tr>
<tr>
<td></td>
<td>Typically developing sample</td>
<td>30</td>
<td>0.77</td>
<td>1.870</td>
<td>0.341</td>
</tr>
<tr>
<td>Writing skills</td>
<td>Clinical Sample</td>
<td>30</td>
<td>18.60</td>
<td>6.775</td>
<td>1.237</td>
</tr>
<tr>
<td></td>
<td>Typically developing sample</td>
<td>30</td>
<td>1.63</td>
<td>2.512</td>
<td>0.459</td>
</tr>
<tr>
<td>CVBC overall score</td>
<td>Clinical Sample</td>
<td>30</td>
<td>64.33</td>
<td>25.641</td>
<td>4.681</td>
</tr>
<tr>
<td></td>
<td>Typically developing sample</td>
<td>30</td>
<td>6.17</td>
<td>7.746</td>
<td>1.414</td>
</tr>
</tbody>
</table>
**Results**: Number of children in each group with each level of difficulty identified by the CVBC

![Graph showing the number of children in each group with each level of difficulty identified by the CVBC.]

**Results**: The correlations between subtest results of the TVPS-3 and the corresponding subsets of the CVBC

<table>
<thead>
<tr>
<th>VP area as defined by the TVPS-3</th>
<th>Pearson correlation</th>
<th>Significance</th>
<th>Coefficient of determination</th>
<th>Percent of shared variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual discrimination</td>
<td>-0.394</td>
<td>0.031*</td>
<td>0.155</td>
<td>15.5%</td>
</tr>
<tr>
<td>Visual memory</td>
<td>-0.522</td>
<td>0.003**</td>
<td>0.272</td>
<td>27.2%</td>
</tr>
<tr>
<td>Visual spatial relations</td>
<td>-0.237</td>
<td>0.208</td>
<td>0.043</td>
<td>4.3%</td>
</tr>
<tr>
<td>Visual form constancy</td>
<td>-0.204</td>
<td>0.279</td>
<td>0.077</td>
<td>7.7%</td>
</tr>
<tr>
<td>Visual sequential memory</td>
<td>-0.328</td>
<td>0.076</td>
<td>0.005</td>
<td>0.5%</td>
</tr>
<tr>
<td>Visual figure ground</td>
<td>-0.305</td>
<td>0.102</td>
<td>0.010</td>
<td>1.0%</td>
</tr>
<tr>
<td>Visual closure</td>
<td>-0.358</td>
<td>0.052</td>
<td>0.002</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)
Discussion: Summary

A convincing body of evidence was not found to support why OTs use standardised VP assessments.

• Little evidence that the assessments actually measure reliably what they purport to measure.

• Scant evidence found to demonstrate a relationship between standardised VP assessment results and the daily life difficulties the children are experiencing.

• Demonstrable lack of consistency between the assessment tools used and the theories and practice models referred to in OT.

Best Practice:

Based on literature reviewed, including OT, psychology and ophthalmology textbooks, and clinical practice, the following is proposed:

• Improved understanding of VP and visual skills in context of child development, sensory processing etc. (e.g. Hierarchical model of functional visual behaviour).
• Thorough information gathering – including the use of tools such as the CVBC.
• Careful clinical observations including qualitative aspects of some standardised tests, possible use of tools such as elements of COOP and AMPS
• In-depth clinical reasoning and intervention planning.
Hierarchical model of functional visual behaviour. (Sullivan, 2014)  

Well adapted Occupational Performance

Visualisation and imagery, visual memory; short and long term

Visual discrimination; FC, FG, VC, Spatial awareness / relationships

Sensory processing; engagement / arousal level, multi-sensory processing, processing speed. Visual attention; selective attention, shared attention

Visual efficiency skills; accommodation, binocular vision, ocular motor control

Visual acuity / eye health / brain integrity

Limitations:

- Small sample size, convenience sample

- Sample drawn from rural population.

- Assumption that CVBC is measuring predominantly visual skills. May be other reasons for some of the observed difficulties.

- Possibility of dual bias; respondents may over report for the CS due to heightened awareness, and may under report for the TDS due to lack of awareness.
Recommendations:

- Further education in the area of visual perception and functional visual skills at undergraduate and post graduate level.
- Further research to investigate the relationship between functional skills and assessment processes in this, and other areas of OT practice
- Further development of CVBC as a tool to assist in the assessment process
- The development of a clinical reasoning tool for visual perceptual assessments

References:

- ETC Consult. ([etcc@iol.ie](mailto:etcc@iol.ie)). 27 April 2012. *Visual Perceptual Assessments*. [E-mail] E-mail to C. Sullivan ([charlottesullivan@eircom.net](mailto:charlottesullivan@eircom.net)). (27 April 2012).
References:


References:

Any Questions?