Vision problems that impact reading and learning

MCO

Dan L. Fortenbacher, O.D., FCOVD
Jamie Jacobs, OD, Resident
Kelsey Starman, OD, Resident
October 26, 2018

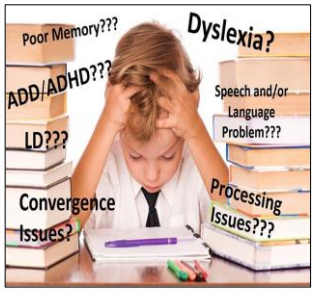
Vision problems that impact lives

MCO

Dan L. Fortenbacher, O.D., FCOVD
Jamie Jacobs, OD, Resident
Kelsey Starman, OD, Resident
October 26, 2018

Vision and Learning Relationship

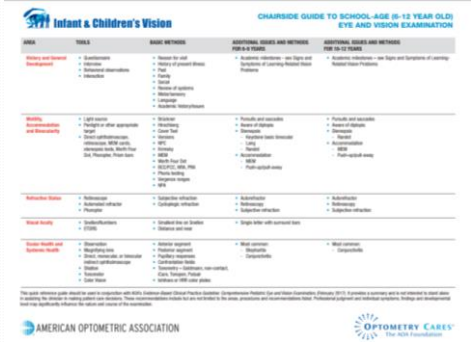
- Vision and learning are both complex systems
- Difficult to define
- Difficult to measure accurately



Why we need evidence based studies

- Insurance
- Other Doctors
- Parent and educators
- Standard of care

AOA Chairside Guide 2017



AOA Chairside Guide 2017

What matters is the patient
Our case presentations

Categories of vision problems

- **Part 1: Visual Efficiency (VE)**
  - Binocular, Accommodative, Oculomotor
  - Impact on reading
  - "Evidence
- **Part 2: Visual Processing and Integration**
  - Visual perceptual and visual information processing
  - Evidence

Case presentation format

- Age, grade,
- Reason for referral
- Quality of Life 30 point Symptom Checklist
- Key tests showing clinical findings
- Key reading tests
- Prescribed treatment Office-based vision therapy, lenses, etc
- Results on clinical findings
- Results on Reading

Visual Efficiency & Reading Case Presentations

.

Nathan

- 13 years old
- 7th grade
- Referred by his teacher

Nathan's "WHY"

- Frequent frontal HA associated with school
- Eyes get red and tired associated with reading
- Dislikes and avoids Reading
- Reading at 4th grade level – per parents
- Poor comprehension with book reading
- Uses book marker or finger


wow vision therapy | SYMPTOM CHECKLIST

Developmental Vision & Rehabilitation

Dan L. Fortenbacher, O.D., FCOVD
Alyssa L. Bartolini, O.D.

Name Nathan Date 10/10/17

Please circle the number that best describes how often you experience each symptom.
0 = never, 1 = seldom, 2 = occasionally, 3 = frequently, 4 = always.

1. Blur when looking at near	0	1	2	3	4
2. Double vision, doubled or overlapping words on page	0	1	2	3	4
3. Headaches while or after doing near vision work	0	1	2	(3)	4
4. Words appear to run together when reading	0	1	2	3	4
5. Burning, itching, stinging, or watery eyes	0	1	2	3	4
6. Falling asleep when reading	0	1	2	3	(4)
7. Seeing and visual work is worse at the end of the day	0	1	2	(3)	4
8. Skipping or repeating lines when reading	0	1	2	3	4
9. Dizziness or nausea associated with near work	0	1	(2)	3	4
10. Head tilt or one eye is closed or covered while reading	0	1	2	3	4
11. Difficulty copying from chalkboard	(1)	1	2	3	4
12. Reversals of letters like "b's" & "d's" or "p's" & "q's"	(0)	1	2	3	4
13. Avoidance of doing near work such as reading	0	1	2	3	(4)
14. Omitting (dropping out) small words when reading	0	1	2	(3)	4
15. Writing uphill or downhill	(0)	1	2	3	4
16. Misaligning digits in columns of numbers	0	1	2	(3)	4
17. Reading comprehension low, or declines as day wears on	0	1	2	3	(4)
18. Poor, inconsistent performance in sports	(0)	1	2	3	4
19. Holding books too close, leans too close to computer screen	0	1	2	3	4
20. Trouble keeping attention centered on reading	0	1	2	3	(4)
21. Difficulty completing assignments in reasonable time	0	1	2	3	4
22. First response is "I can't" before trying	0	1	2	3	(4)
23. Avoiding sports and games	(0)	1	2	3	4
24. Poor hand/eye coordination, such as poor handwriting	(0)	1	2	3	4
25. Inability to estimate distances accurately	0	1	(2)	3	4
26. Clumsy, accident prone, knocks things over	(0)	1	2	3	4
27. Misplaces or loses papers, objects, belongings	0	1	2	(3)	4
28. Car sickness/motion sickness	(0)	1	2	3	4
29. Forgetful, poor memory	0	1	2	3	(4)
30. Very sensitive to lighting (too light or dark) when reading	(0)	1	2	3	4
	0	1	15	29	42

43

Clinical Findings

- VA: 20/20 OD, OS
- Motilities: occasional loss c CL
- **NPC: 8/9" R/G**
- Subjective refraction: OD plano, OS +0.25
- Stereo: 60" distance, 18" near

Clinical Findings

- Lateral phoria: 1x distance / **6x near**
- Distance ranges: BI x/9/6, BO 10/12/6
- Near ranges: BI 10/12/8, **BO 4/6/2**
- NRA: +2.25/+2.00, PRA: -2.25/-2.00

Clinical Findings

- During exam, Nathan stated "These tests are giving me a headache" and "I feel like I need to take a nap"
- Mom added "For most of his school life, after school he comes home and takes a nap"

Assessment of Reading and Oculomotor (13 yo / 7th grade)

- **King Devick** – 12 yo (54"/ 0 errors)
- **Visagraph** – 4.2 GLE, 70% comprehension
- **Gates-McKillop Oral Reading Test** – 6.0 grade / 11.2 age
- **TOSWRF** – 30%, 92 standard score
- **Dynamic Reader Comprehension Test** – 6th grade story, 169 wpm, 80% comprehension
- **DDT** – 9-12 grade, eidetic

Diagnosis

- Convergence Insufficiency
- Oculomotor dysfunction, saccadic eye movement
- Accommodative dysfunction, mild

Prescribed Treatment

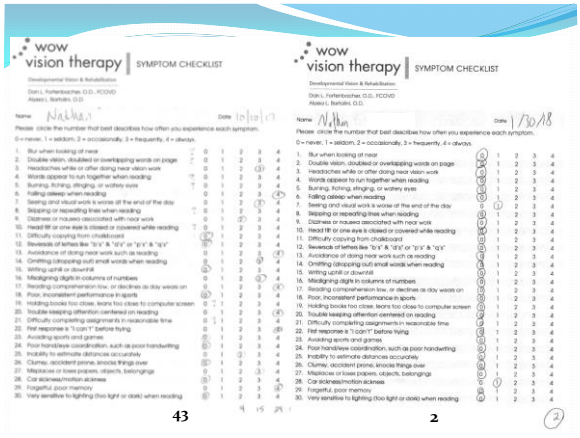
- 25 hours of office-based vision therapy
- Low plus lenses for near work

Nathan's Goals

1. To reduce or eliminate headaches while reading
2. To struggle less with reading
3. To find my place easily after looking away
4. To read print without frequently losing my place
5. To be able to copy from the board to paper in a normal amount of time

Key Tests	Before VT	After VT
Motilities	Occasional loss c CL	Excellent c CL
NPC	**8/9"**	**Nose**
Distance BO Ductions	10/12/6	x/36/18
Near Phoria	6x	6x
Near BO Ductions	**4/6/2**	**x/40/32**
Stereo	18" N / 60" D	12.5" N / 40" D
NRA	+2.25	+3.00
PRA	-2.25	>-3.00

Key Tests	Before VT (13.2 yo)	After VT (13.6 yo)
King Devick	12 yo (54" / 0 errors)	14+ (50" / 0 errors)
Visagraph	4.2 GLE, 70% comp (level 4)	**12.6 GLE, 70% comp (level 5)**
Gates	6.0 grade, 11.2 age	7.3 grade, 12.7 age
TOSWRF	30%, 92 standard score	**65%, 106 standard score**
Dynamic Reader Comp	6th grade, 169 wpm, 80% comp	**6th grade, 214 wpm, 80% comp**
DDT	9-12 grade, eidetic	9-12 grade, eidetic


wow vision therapy | SYMPTOM CHECKLIST

Name Nathan Date 10/10/17

Please circle the number that best describes how often you experience each symptom.

0 = never, 1 = seldom, 2 = occasionally, 3 = frequently, 4 = always.

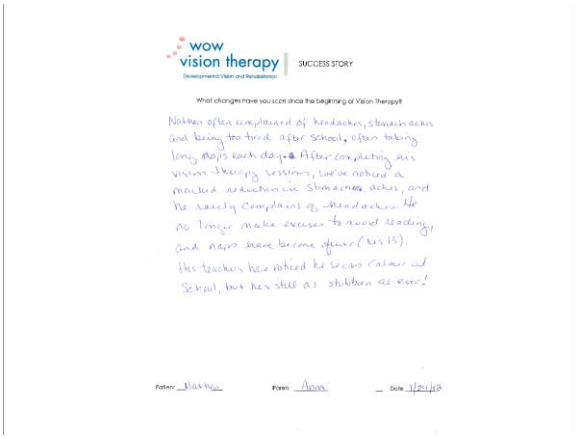
wow vision therapy | SYMPTOM CHECKLIST

Name Nathan Date 1/30/18

Please circle the number that best describes how often you experience each symptom.

0 = never, 1 = seldom, 2 = occasionally, 3 = frequently, 4 = always.

43 2


wow vision therapy | SUCCESS STORY

What changes have you seen since the beginning of Vision Therapy?

Nathan often complained of headaches, stomachaches and being too tired after school, often taking long naps each day. After completing his vision therapy sessions, we've noticed a marked reduction in stomachaches, aches, and he rarely complains of headaches. He no longer makes excuses to avoid reading and naps have become fewer (yeah!). His teachers have noticed he seems calmer at school, but he's still as stubborn as ever!

Patient Nathan Parent Anna Date 1/24/18

CLINICAL TRIALS

SECTION EDITOR: ROY W. BECK, MD, PhD

Randomized Clinical Trial of Treatments for Symptomatic Convergence Insufficiency in Children

*Convergence Insufficiency Treatment Trial Study Group**

Objective: To compare home-based pencil push-ups (HBPP), home-based computer vergence/accommodative therapy and pencil push-ups (HBCVAT+), office-based vergence/accommodative therapy with home reinforcement (OBVAT), and office-based placebo therapy with home reinforcement (OBPT) as treatments for symptomatic convergence insufficiency.

Methods: In a randomized clinical trial, 221 children aged 9 to 17 years with symptomatic convergence insufficiency were assigned to 1 of 4 treatments.

Main Outcome Measures: Convergence Insufficiency Symptom Survey score after 12 weeks of treatment. Secondary outcomes were near point of convergence and positive fusional vergence at near.

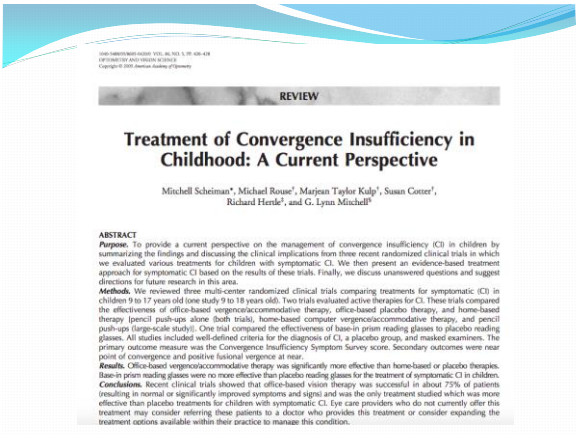
Results: After 12 weeks of treatment, the OBVAT group's mean Convergence Insufficiency Symptom Survey score (15.1) was statistically significantly lower than those of 21.3, 24.7, and 21.9 in the HBCVAT+, HBPP, and OBPT groups, respectively ($P < .001$). The OBVAT group also demonstrated a significantly improved near point of convergence and positive fusional vergence at near compared with the other groups ($P \leq .005$ for all comparisons). A successful or improved outcome was found in 73%, 43%, 33%, and 35% of patients in the OBVAT, HBPP, HBCVAT+, and OBPT groups, respectively.

Conclusions: Twelve weeks of OBVAT results in a significantly greater improvement in symptoms and clinical measures of near point of convergence and positive fusional vergence and a greater percentage of patients reaching the predetermined criteria of success compared with HBPP, HBCVAT+, and OBPT.

Application to Clinical Practice: Office-based vergence accommodative therapy is an effective treatment for children with symptomatic convergence insufficiency.

Trial Registration: clinicaltrials.gov Identifier: NCT00338611

Arch Ophthalmol. 2008;126(10):1336-1349



REVIEW

Treatment of Convergence Insufficiency in Childhood: A Current Perspective

Mitchell Scheiman*, Michael Rouse†, Marjean Taylor Kulp‡, Susan Cotter†, Richard Hertle§, and G. Lynn Mitchell‖

ABSTRACT

Purpose. To provide a current perspective on the management of convergence insufficiency (CI) in children by summarizing the findings and discussing the clinical implications from three recent randomized clinical trials in which we evaluated various treatments for children with symptomatic CI. We then present an evidence-based treatment approach for symptomatic CI based on the results of these trials. Finally, we discuss unanswered questions and suggest directions for future research in this area.

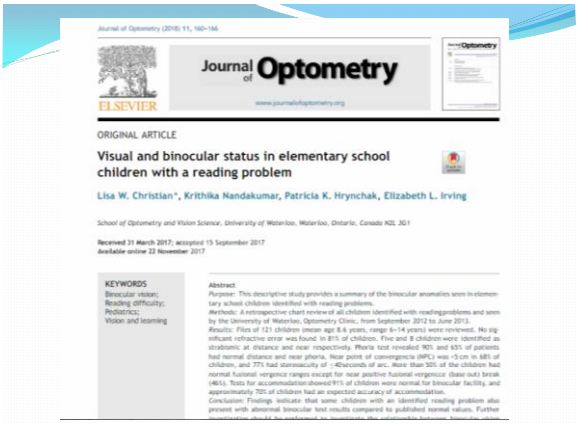
Methods. We reviewed three multi-center randomized clinical trials comparing treatments for symptomatic (CI) in children 9 to 17 years old (one study 9 to 18 years old). Two trials evaluated active therapies for CI. These trials compared the effectiveness of office-based vergence/accommodative therapy, office-based placebo therapy, and home-based therapy (pencil push-ups alone (both trials), home-based computer vergence/accommodative therapy, and pencil push-ups (large-scale study)). One trial compared the effectiveness of base-in prism reading glasses to placebo reading glasses. All studies included well-defined criteria for the diagnosis of CI, a placebo group, and masked examiners. The primary outcome measure was the Convergence Insufficiency Symptom Survey score. Secondary outcomes were near point of convergence and positive fusional vergence at near.

Results. Office-based vergence/accommodative therapy was significantly more effective than home-based or placebo therapies. Base-in prism reading glasses were no more effective than placebo reading glasses for the treatment of symptomatic CI in children.

Conclusions. Recent clinical trials showed that office-based vision therapy was successful in about 75% of patients (resulting in normal or significantly improved symptoms and signs) and was the only treatment studied which was more effective than placebo treatments for children with symptomatic CI. Eye care providers who do not currently offer this treatment may consider referring these patients to a doctor who provides this treatment or consider expanding the treatment options available within their practice to manage this condition.

Conclusions

- Office-based vergence accommodative therapy is an effective treatment for children with symptomatic convergence insufficiency. Home-based vision therapy is no better than a placebo. Base-In Prisms are no better than a placebo for CI.



Journal of Optometry (2018) 11, 160–166

Journal of Optometry

www.journalofoptometry.org

ELSEVIER

ORIGINAL ARTICLE

Visual and binocular status in elementary school children with a reading problem

Lisa W. Christian*, Krithika Nandakumar, Patricia K. Hrynchak, Elizabeth L. Irving

School of Optometry and Vision Science, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1

Received 31 March 2017; accepted 15 September 2017
Available online 22 November 2017

KEYWORDS
Binocular vision;
Reading difficulty;
Pediatrics;
Vision and learning

Abstract

Purpose: This descriptive study provides a summary of the binocular anomalies seen in elementary school children identified with reading problems.

Methods: A retrospective chart review of all children identified with reading problems and seen by the University of Waterloo, Optometry Clinic, from September 2012 to June 2013.

Results: Files of 121 children (mean age 8.6 years, range 6–14 years) were reviewed. No significant refractive error was found in 81% of children. Five and 8 children were identified as strabismic at distance and near respectively. Phoria test revealed 70% and 63% of patients had normal distance and near phoria. Near point of convergence (NPC) was ~5 cm in 68% of children, and 77% had stereoacuity of ~40 seconds of arc. More than 50% of the children had normal fusional vergence ranges except for near positive fusional vergence (base out) break (46%). Tests for accommodation showed 91% of children were normal for binocular facility, and approximately 70% of children had an expected accuracy of accommodation.

Conclusion: Findings indicate that some children with an identified reading problem also present with abnormal binocular test results compared to published normal values. Further

Conclusion

- "The results in this study show that children with an IEP for reading also present with abnormal binocular and/or accommodative test results. To thoroughly investigate the binocular vision system, we recommend that tests of accommodation, binocular vision, and oculomotor function should be performed on all children, especially those with identified reading problems."

Tanner

- 11 years old
- 5th grade
- Referred by Facebook

Tanner's "WHY"

- Has struggled in reading since 1st grade
  - Skips and loses place easily
  - Slow reading speed
- Poor attention and concentration
- "Exhausted when he comes home from school"


wow vision therapy SYMPTOMS CHECKLIST

name Tanner date 11/6/17

Please complete this questionnaire. After each symptom listed, circle the number that best describes how often you experience that particular problem.

0 = never, 1 = seldom, 2 = occasionally, 3 = frequently, 4 = always.

1. Blur when looking at near	(0)	1	2	3	4
2. Double vision, doubled or overlapping words on page	(0)	1	2	3	4
3. Headaches while or after doing near vision work	(0)	1	2	3	4
4. Words appear to run together when reading	0	(1)	2	3	4
5. Burning, itching, stinging, or watery eyes	(0)	1	2	3	4
6. Falling asleep when reading	(0)	1	2	3	4
7. Seeing blur visual work is worse at the end of the day	0	1	2	(3)	4
8. Skipping or repeating lines when reading	0	1	2	(3)	4
9. Dizziness or nausea associated with near work	(0)	1	2	3	4
10. Need tilt or one eye is closed or covered while reading	(0)	1	2	3	4
11. Difficulty copying from chalkboard	0	(1)	2	3	4
12. Reversals of letters like "b's" & "d's" or "p's" & "q's"	0	1	2	(3)	4
13. Avoidance of doing near work such as reading	0	1	2	(3)	4
14. Omitting, changing out small words when reading	0	1	2	(3)	4
15. Writing uphill or downhill	0	1	(2)	3	4
16. Misaligning digits in columns of numbers	0	1	2	(3)	4
17. Reading comprehension low, or declines as day wears on	0	1	2	(3)	4
18. Poor, inconsistent performance in sports	0	1	2	(3)	4
19. Holding books too close, leans too close to computer screen	0	(1)	2	3	4
20. Trouble keeping attention centered on reading	0	1	2	(3)	4
21. Difficulty completing assignments in reasonable time	0	1	(2)	3	4
22. Fast response is "I can't" before trying	0	1	(2)	3	4
23. Avoiding sports and games	0	1	2	(3)	4
24. Poor hand/eye coordination, such as poor handwriting	0	1	2	(3)	4
25. Inability to estimate distances accurately	0	(1)	2	3	4
26. Clumsy, accident prone, knocks things over	0	(1)	2	3	4
27. Misplaces or loses papers, objects, belongings	0	(1)	2	3	4
28. Car sickness/motion sickness	(0)	1	2	3	4
29. Forgetful, poor memory	0	1	(2)	3	4

47

Clinical Findings

- VA: 20/20 OD, OS
- **Motilities: loss c CL**
- **NPC: 12/18" R/G**
- Subjective refraction: OD +0.25, OS +0.50
- Stereo: 40" distance, 18" near

Clinical Findings

- Lateral phoria: ½ x distance / 6x near
- Distance ranges: BI x/8/5, BO x/18/12
- Near ranges: BI x/14/8, BO x/24/12
- **NRA: +2.25/+2.00, PRA: -1.00/-0.50**
- **Donders: 5/6" OD, 6/7" OS, 5/6" OU**
- **+/- 2.00 Flippers: can't clear minus**

Assessment of Reading and Oculomotor

(11.1 yo / 5th grade)

- **King Devick** – 8 yo (78"/ 0 errors)
- **Visagraph** – 1.0 GLE, 80% comprehension, level 3
- **Gates-McKillop Oral Reading Test** – 4.8 grade/ 10.0 age
- **TOSWRF** – 16%, 85 standard score
- **Vision Builder Comprehension Test** – 3rd grade story, 81 wpm, 70% comprehension
- **DDT** – 3rd, eidetic

Diagnosis

- Accommodative Dysfunction
- Convergence Insufficiency
- Oculomotor Dysfunction

Prescribed Treatment

- 30 hours of office-based vision therapy
- Low plus lenses for near work
- Perceptual Therapy System Computer Program (PTSII)...modeled from Solan Research
- Dynamic Reader Program

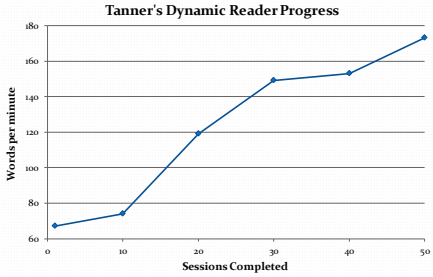
Tanner's Goals

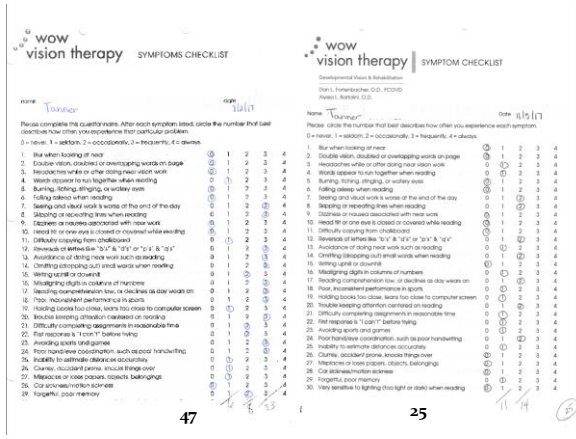
1. To struggle less with reading
2. To have homework be less frustrating
3. To improve attention span/concentration
4. To read print without frequently losing my place
5. To find my place easily after looking away

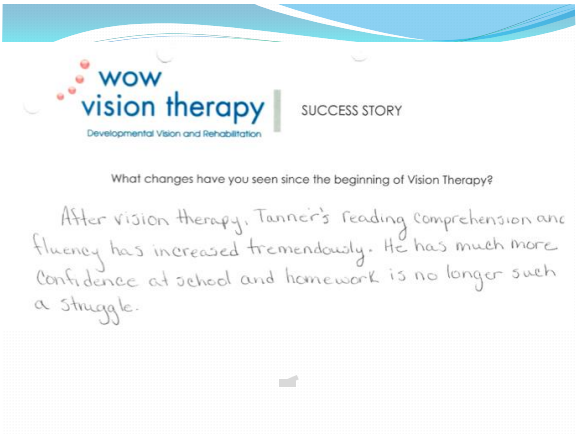
Key Tests	Before VT	After VT
Motilities	Loss c CL	Excellent c CL
NPC	12/18"	2"
Near Phoria	6x	Ortho
Near BO Ductions	x/24/12	30/38/22
NRA	+2.25/+2.00	+2.50/+2.25
PRA	-1.00/-0.50	>-3.00
Donders	5/6 OD, 6/7 OS, 5/6 OU	<4" OD, OS, OU
+/- 2.00 Flippers	Can't clear –	15 cpm

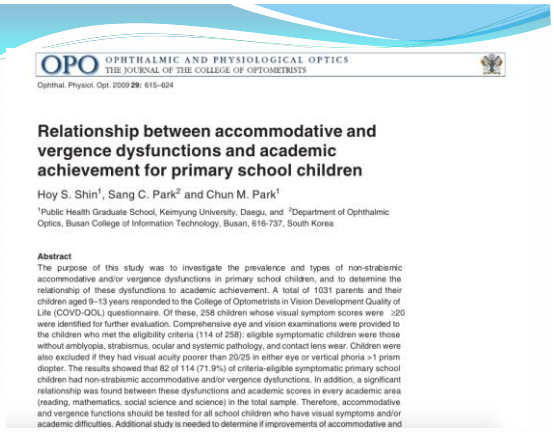
Key Tests	Before VT (11.1 yo)	After VT (11.5 yo)
King Devick	8 yo (78" / 0 errors)	**10.5 (66" / 0 errors)**
Gates	4.8 grade, 10 age	**6.5 grade, 11.9 age**
TOSWRF	16%, 85 standard score	35%, 91 standard score
DDT	3rd grade, eidetic	**5th grade, eidetic**

DR – Standard Dynamic Reading








OPO OPHTHALMIC AND PHYSIOLOGICAL OPTICS
THE JOURNAL OF THE COLLEGE OF OPTOMETRISTS

Ophthal. Physiol. Opt. 2009 29: 615–624

Relationship between accommodative and vergence dysfunctions and academic achievement for primary school children

Hoy S. Shin[1], Sang C. Park[2] and Chun M. Park[1]

[1]Public Health Graduate School, Keimyung University, Daegu, and [2]Department of Ophthalmic Optics, Busan College of Information Technology, Busan, 616-737, South Korea

Abstract

The purpose of this study was to investigate the prevalence and types of non-strabismic accommodative and/or vergence dysfunctions in primary school children, and to determine the relationship of these dysfunctions to academic achievement. A total of 1031 parents and their children aged 9–13 years responded to the College of Optometrists in Vision Development Quality of Life (COVD-QOL) questionnaire. Of these, 258 children whose visual symptom scores were ≥20 were identified for further evaluation. Comprehensive eye and vision examinations were provided to the children who met the eligibility criteria (114 of 258): eligible symptomatic children were those without amblyopia, strabismus, ocular and systemic pathology, and contact lens wear. Children were also excluded if they had visual acuity poorer than 20/25 in either eye or vertical phoria >1 prism diopter. The results showed that 82 of 114 (71.9%) of criteria-eligible symptomatic primary school children had non-strabismic accommodative and/or vergence dysfunctions. In addition, a significant relationship was found between these dysfunctions and academic scores in every academic area (reading, mathematics, social science and science) in the total sample. Therefore, accommodative and vergence functions should be tested for all school children who have visual symptoms and/or academic difficulties. Additional study is needed to determine if improvements of accommodative and

Conclusion

- "A significant relationship was found between accommodative and vergence dysfunctions and academic scores in every academic area (reading, math, social science and science) in the total sample. Therefore, accommodative and vergence dysfunctions should be tested for all school children who have visual symptoms and/or academic difficulty."


ORIGINAL ARTICLE

Treatment of Accommodative Dysfunction in Children: Results from a Randomized Clinical Trial

Mitchell Scheiman*, Susan Cotter†, Marjean Taylor Kulp†, G. Lynn Mitchell‡, Jeffrey Cooper§, Michael Gallaway‖, Kristine B. Hopkins¶, Mary Bartuccio**, Ida Chung‖, and the Convergence Insufficiency Treatment Trial Study Group

ABSTRACT

Purpose. To report the effectiveness of various forms of vision therapy/orthoptics in improving accommodative amplitude and facility in children with symptomatic convergence insufficiency (CI) and co-existing accommodative dysfunction.

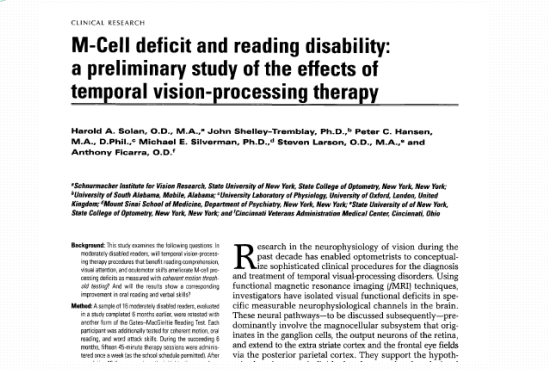
Methods. In a randomized clinical trial, 221 children aged 9 to 17 years with symptomatic CI were assigned to one of four treatments. Of the enrolled children, 164 (74%) had accommodative dysfunction; 63 (29%) had a decreased amplitude of accommodation with respect to age, 43 (19%) had decreased accommodative facility, and 58 (26%) had both. Analysis of variance models were used to compare mean accommodative amplitude and accommodative facility for each treatment group after 4, 8, and 12 weeks of treatment.

Results. After 12 weeks of treatment, the increases in amplitude of accommodation [office-based vergence/accommodative therapy with home reinforcement group (OBVAT) 9.9 D, home-based computer vergence/accommodative therapy group (HBCVAT+) 6.7 D, and home-based pencil push-up therapy group (HBPP) 5.8 D] were significantly greater than in the office-based placebo therapy (OBPT) group (2.2 D) (p-values ≤0.0108. Significant increases in accommodative facility were found in all groups (OBVAT: 9 cpm, HBCVAT+: 7 cpm, HBPP: 5 cpm, OBPT: 5.5 cpm); only the improvement in the OBVAT group was significantly greater than that found in the OBPT group (p = 0.016). One year after completion of therapy, reoccurrence of decreased accommodative amplitude was present in only 12.5% and accommodative facility in only 11%.

Conclusions. Vision therapy/orthoptics is effective in improving accommodative amplitude and accommodative facility in school-aged children with symptomatic CI and accommodative dysfunction.

Conclusion

- Vision Therapy/orthoptics is effective in improving accommodative amplitude and accommodative facility in school age children with symptomatic convergence insufficiency (CI) and accommodative dysfunction.


CLINICAL RESEARCH

M-Cell deficit and reading disability: a preliminary study of the effects of temporal vision-processing therapy

Harold A. Solan, O.D., M.A.,* John Shelley-Tremblay, Ph.D.,† Peter C. Hansen, M.A., D.Phil.,‡ Michael E. Silverman, Ph.D.,§ Steven Larson, O.D., M.A.,* and Anthony Ficarra, O.D.¶

*Schnurmacher Institute for Vision Research, State University of New York, State College of Optometry, New York, New York; †University of South Alabama, Mobile, Alabama; ‡University Laboratory of Physiology, University of Oxford, London, United Kingdom; §Mount Sinai School of Medicine, Department of Psychiatry, New York, New York; ¶State University of New York, State College of Optometry, New York, New York; and ‖Cincinnati Veterans Administration Medical Center, Cincinnati, Ohio

Background: This study examines the following questions: In moderately disabled readers, will temporal-vision-processing therapy procedures that benefit reading comprehension, visual attention, and oculomotor skills ameliorate M-cell processing deficits as measured with *coherent motion threshold testing*? And will the results show a corresponding improvement in oral reading and verbal skills?

Method: A sample of 16 moderately disabled readers, evaluated in a study completed 6 months earlier, were retested with another form of the Gates-MacGinitie Reading Test. Each participant was additionally tested for coherent motion, oral reading, and word attack skills. During the succeeding 6 months, fifteen 45-minute therapy sessions were administered once a week (as the school schedule permitted). After

Research in the neurophysiology of vision during the past decade has enabled optometrists to conceptualize sophisticated clinical procedures for the diagnosis and treatment of temporal visual-processing disorders. Using functional magnetic resonance imaging (fMRI) techniques, investigators have isolated visual functional deficits in specific measurable neurophysiological channels in the brain. These neural pathways—to be discussed subsequently—predominantly involve the magnocellular subsystem that originates in the ganglion cells, the output neurons of the retina, and extend to the extra striate cortex and the frontal eye fields via the posterior parietal cortex. They support the hypoth-

Conclusion

- This research supports the value of rendering temporal vision therapy to children identified as moderately reading disabled.

Visual Efficiency/ Visual Processing and Reading/Learning Case Presentation

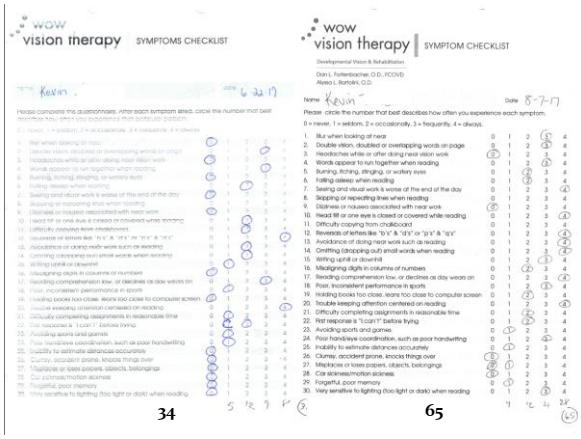
.

Kevin

- 6.5 years old
- Kindergarten
- Referred by OTR and past patient word of mouth

Kevin's "WHY"

- Teacher concerned about reading
- Kevin is not aware of problems keeping his place
- Letter reversals
- Rubs eyes



Clinical Findings

- VA: 20/20 OD, OS
- CT: Ortho at distance, **10x at near**
- **Motilities: very poor**
- **NPC: 16/24" R/G**
- Subjective refraction: OD +0.50, OS +0.75
- Stereo: 120" distance, 100" near

Clinical Findings

- Lateral phoria: ortho distance / **6x near**
- Distance ranges: BI x/6/3, BO x/12/6
- Near ranges: BI x/16/4, **BO x/22/6**
- **NRA: +2.00/+1.75, PRA: -1.00/-0.50**
- **Donders: 5/6" OD, 5/6" OS, 7/8" OU**

Assessment of Visual Processing
(6.5 yo / Kindergarten)

- **King Devick** – <6yo (175"/ 33 errors)
- **Gates-McKillop Oral Reading Test** – non-reader
- **DDT** – non-reader
- **Jordan** – <4.0
- **TVPS: VD, VSR, VSM** – <4.0
- **Wold** – <1st (incomplete)

Diagnosis

- Convergence Insufficiency
- Accommodative Dysfunction
- Oculomotor Dysfunction
- Delays in Visual Information Processing
- Delays in Visual Motor Integration

Prescribed Treatment

- 45 hours of office-based vision therapy
- Explore yoked prism
- 3D computer program

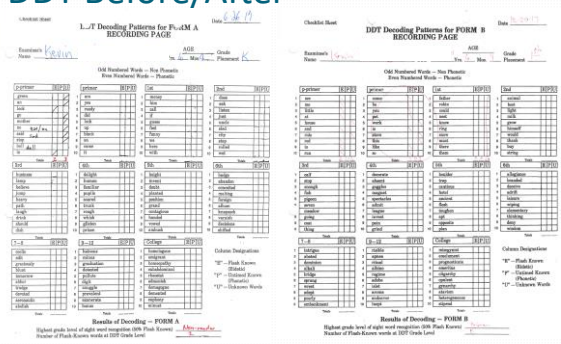
Kevin's Goals

1. To struggle less with reading (readiness)
2. To be able to keep my vision clear and single
3. To stop reversing letters, numbers, number groups and words
4. To be able to copy from the board to paper
5. To improve my attention span/concentration

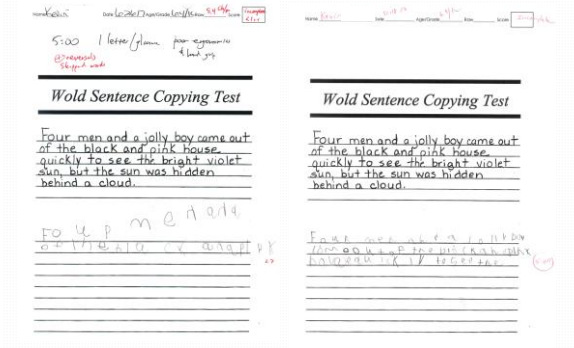
Key Tests	Before VT	After VT
Motilities	Very poor	Excellent c CL
NPC	16/24"	2/3"
Near BO Ductions	x/22/6	x/24/12
Stereo	100" N / 120" D	12.5" N / 40" D
NRA	+2.00/+1.75	+2.75/+2.50
PRA	-1.00/-0.50	>-3.00
Donders	5/6" OD, 5/6" OS, 6/7" OU	<4" OD, OS, OU

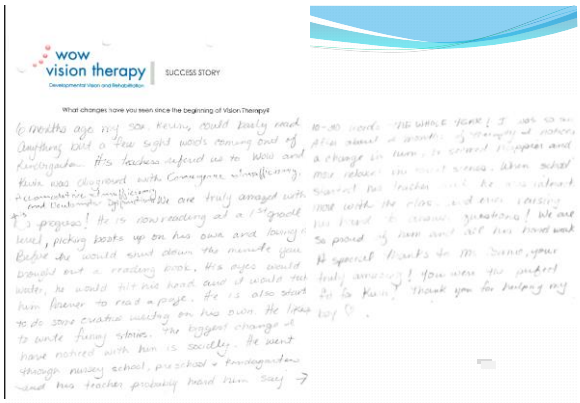
Key Tests	Before VT (6.4 yo)	After VT (6.9 yo)
King Devick	<6 yo (175" / 33 errors)	**6 yo (120" / 7 errors)**
DDT	Non-reader	**Primer, eidetic**
Jordan	<4.0	**4.7**
VD	<4.0	**7.10**
VSR	<4.0	**9.3**
VSM	<4.0	**5.5**

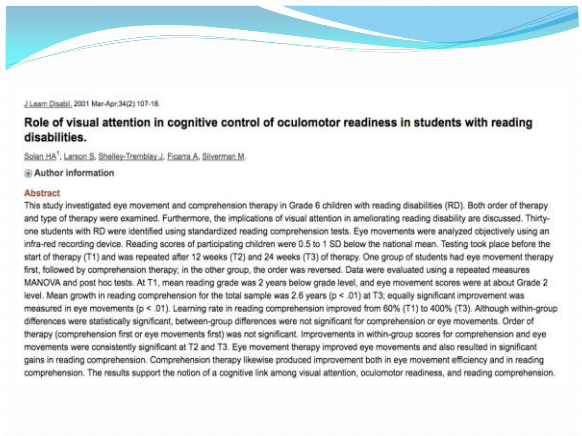
DDT Before/After



Wold Before/After







J Learn Disabil. 2001 Mar-Apr;34(2):107-18.

Role of visual attention in cognitive control of oculomotor readiness in students with reading disabilities.

Solan HA[1], Larson S, Shelley-Tremblay J, Ficarra A, Silverman M.

Author information

Abstract

This study investigated eye movement and comprehension therapy in Grade 6 children with reading disabilities (RD). Both order of therapy and type of therapy were examined. Furthermore, the implications of visual attention in ameliorating reading disability are discussed. Thirty-one students with RD were identified using standardized reading comprehension tests. Eye movements were analyzed objectively using an infra-red recording device. Reading scores of participating children were 0.5 to 1 SD below the national mean. Testing took place before the start of therapy (T1) and was repeated after 12 weeks (T2) and 24 weeks (T3) of therapy. One group of students had eye movement therapy first, followed by comprehension therapy; in the other group, the order was reversed. Data were evaluated using a repeated measures MANOVA and post hoc tests. At T1, mean reading grade was 2 years below grade level, and eye movement scores were at about Grade 2 level. Mean growth in reading comprehension for the total sample was 2.6 years ($p < .01$) at T3; equally significant improvement was measured in eye movements ($p < .01$). Learning rate in reading comprehension improved from 60% (T1) to 400% (T3). Although within-group differences were statistically significant, between-group differences were not significant for comprehension or eye movements. Order of therapy (comprehension first or eye movements first) was not significant. Improvements in within-group scores for comprehension and eye movements were consistently significant at T2 and T3. Eye movement therapy improved eye movements and also resulted in significant gains in reading comprehension. Comprehension therapy likewise produced improvement both in eye movement efficiency and in reading comprehension. The results support the notion of a cognitive link among visual attention, oculomotor readiness, and reading comprehension.

Conclusion

- Eye movement therapy improved eye movements which resulted in significant gains in reading comprehension.

Journal of Optometry (2018) 11, 40–48

Journal of Optometry

www.journalofoptometry.org

ORIGINAL ARTICLE

Efficacy of vision therapy in children with learning disability and associated binocular vision anomalies

Jameel Rizwana Hussaindeen[a,b,*], Prerana Shah[a,b], Krishna Kumar Ramani[a], Lalitha Ramanujan[c]

[a] Srimathi Sundari Subramanian Department of Visual Psychophysics, Elite School of Optometry (In Collaboration with Birla Institute of Technology and Science), Unit of Medical Research Foundation, 8, G.S.T. Road, St. Thomas Mount, Chennai 600016, India
[b] Binocular Vision and Vision Therapy Clinic, Sankara Nethralaya, 18, College Road, Nungambakkam, Chennai 600006, India
[c] Alpha to Omega Learning Center, Chennai, India

Received 14 June 2016; accepted 14 February 2017
Available online 7 June 2017

KEYWORDS
Binocular vision anomalies;
Learning disability;
Non-strabismic binocular vision

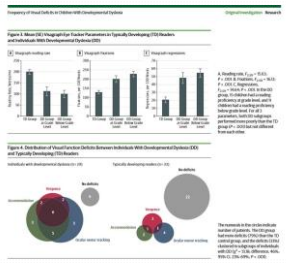
Abstract
Purpose: To report the frequency of binocular vision (BV) anomalies in children with specific learning disorders (SLD) and to assess the efficacy of vision therapy (VT) in children with a non-strabismic binocular vision anomaly (NSBVA).
Methods: The study was carried out at a centre for learning disability (LD). Comprehensive eye examination and binocular vision assessment was carried out for 94 children (mean (SD) age:

Conclusion:

- Children with specific learning disorders have a high frequency of binocular vision disorders and vision therapy plays a significant role in improving the BV parameters. Children with SLD should be screened for BV anomalies as it could potentially be an added hindrance to the reading difficulty in this special population.

New research

- JAMA- Ophthalmology
  - ***Frequency of Visual Deficits in Children With Developmental Dyslexia***



Conclusion

- This study demonstrates deficits in the visual functioning of children with dyslexia…We propose that assessment of vergence, accommodation, and eye movements may be helpful in the initial evaluation of children with dyslexia and will supplement the findings of a comprehensive ophthalmologic examination and a detailed literacy evaluation.

Do We Need Evidence for Everything?

David G. Hunter, M.D., Ph.D

ABSTRACT

There is no randomized, controlled trial (RCT) supporting the contention that evidence-based medicine is beneficial, and "evidence" is more than the information that can be obtained from RCTs. Systematic reviews have severe limitations of scope and reach, and RCTs can lead to false or contradictory conclusions. Most controlled studies enroll only highly selected groups of patients, specifically excluding those with complicating factors, yet real patients bring with them an abundance of messy heterogeneity. Considering this, we should not withhold potentially beneficial treatment just because we lack randomized controlled trials. The frequent lack of solid clinical evidence requires clinicians to invoke critical thinking, communication, judgment, and even intuition on behalf of their patients. Medical training is as much an apprenticeship as it is an education, and medicine as much a craft as it is an art.

- What constitutes evidence?
  - Prospective, randomized, controlled trials
  - Double blind interventional studies
  - Chart reviews
  - Case Reports
  - Years of experience
  - Your own patients
- High quality evidence may mislead us
- Lack of high quality evidence does not necessarily indicate the lack of correlation of intervention with outcome.

Experiencing those Moments

Private Practice Extern or Residency

Additional resources

- Dr. Fortenbacher VisionHelp Blog posts
- Wow Vision Therapy Website
  - Wow Vision SCO Private Practice Residency
- VisionHelp Website
  - VisionHelp Concussion Project
  - VisionHelp Amblyopia Project
  - VisionHelp Vison and Learning Project

VisionHelp Vision & Learning Project

Questions??