

University of South Dakota

USD RED

---

Occupational Therapy Capstone Presentations

Theses, Dissertations, and Student Projects

---

5-4-2024

## An Eye-Opening Capstone: A New Perspective on Occupation-Based Treatments for Neurologic-Based Visual Deficits

Katlyn J. Knakmuhs

University of South Dakota, [Katlyn.Knakmuhs@coyotes.usd.edu](mailto:Katlyn.Knakmuhs@coyotes.usd.edu)

Follow this and additional works at: <https://red.library.usd.edu/ot-capstone>



Part of the [Occupational Therapy Commons](#)

---

### Recommended Citation

Knakmuhs, Katlyn J., "An Eye-Opening Capstone: A New Perspective on Occupation-Based Treatments for Neurologic-Based Visual Deficits" (2024). *Occupational Therapy Capstone Presentations*. 120.  
<https://red.library.usd.edu/ot-capstone/120>

This Oral Presentation/Poster is brought to you for free and open access by the Theses, Dissertations, and Student Projects at USD RED. It has been accepted for inclusion in Occupational Therapy Capstone Presentations by an authorized administrator of USD RED. For more information, please contact [dloftus@usd.edu](mailto:dloftus@usd.edu).

# An Eye-Opening Capstone: A New Perspective on Occupation-Based Treatments for Neurologic-Based Visual Deficits

Student: Katlyn Knakmuhs, OTS  
Faculty Mentor: Karen Hebert, PhD, OTR/L

## BACKGROUND

- Concussions have been found to affect roughly 1.4 to 3.8 million people annually in the United States (Jaber et al., 2019).
- Ocular dysfunction affects roughly 69% post-concussion (Gunasekaran et al., 2019).
- Visual impairments can result in decreased spatial orientation, balance, coordination, and body awareness (Chokron & Dutton, 2016), as well as reduced social participation and increased difficulty to complete ADLs/IADLs (Teutsch, 2016; Wagener & Kreiger, 2019).
- Much of the existing literature focused on paper-based and computer-based tasks for treatment of visual perceptual deficits.
- Other treatment strategies:
  - Remedial strategies (eye exercises, home exercise programs, & cognitive rehabilitation exercises)
  - Compensatory strategies (visual scanning & daily modification to tasks)

## PURPOSE

- The purpose of this capstone was to implement occupation-based skills and activities into therapy sessions for individuals experiencing visual perceptual deficits post-concussion.

## THEORETICAL FOUNDATION

- **Warren's Hierarchy of Visual Perceptual Skills Model**
  - Suggests that if base level visual skills were not intact, the skills higher in the hierarchy are also impaired. This theory acted as a guide for where to start the rehabilitation process.
- **Toglia's Dynamic Interactional Approach (DIA)**
  - Supports providing cues and modifying tasks while focusing on the constructs of the person, activity, and context. This theory guided intervention to alter one or more constructs to promote success and encourage carryover of learned skills.

## METHODS

- Participants: 8 individuals (3 males, 5 females, age range 10-68) from the Sanford Outpatient Clinic in Sioux Falls, SD who were experiencing visual perceptual deficits post-concussion.
- Concussions occurred from a motor vehicle accident (MVA), work related fall/injury, or a sports related injury (basketball/cheerleading).

### Assessment Instruments

- InVision Assessment: 3 tests- Perception Time Test (PTT), Dynamic Visual Acuity (DVA), and Gaze Stabilization Test (GST)
- Dizziness Handicap Inventory (DHI): Asks 25 questions that establish the level of handicap related to a patient's dizziness symptoms based on functional, emotional, and physical categories.
- Semi-Structured Interviews: Gathered information about symptoms and deficits in vision, difficulties related to activities of daily living (ADLs) and instrumental activities of daily living (IADLs) prior to and after treatment.

### Interventions

- 45-minute session one time per week as the schedule allowed – average of 2-7 sessions
- Initial evaluation: Oculomotor assessment, InVision assessment, DHI, Neuro Sensorimotor Integrator (NSI), semi-structured interview, treatment interview
- Scanning activities: Vision boards, scanning number/letter walls, card organization/scanning, saccadic door jams, board or card games, comprehension questions for a calendar/schedule/passage, HART charts, etc.
- Other activities: Body movement, positional changes, reaction time, hand-eye coordination, visual motion, etc.

## RESULTS

- **Quantitative**
  - 7/8 patients demonstrated an improvement in their InVision scores
  - 2/8 patients improved in one test, 3/8 participants improved in two, and 2/8 participants improved in all three tests
  - 8/8 participants demonstrated an improvement in DHI scores (average improvement of 39.25 points)
- **Qualitative**
  - Pre-Intervention: Reported symptoms of ocular dysfunction and difficulty completing IADLs
  - Post-Intervention: No reported symptoms, increased ease of completing ADLs/IADLs, 100% client satisfaction with treatment, 1/8 patients demonstrated continued migraines
- 100% of clients demonstrated an improvement in visual perceptual deficits and reported satisfaction of treatment after the occupation-based treatment sessions.

Patient	InVision Pre-Intervention	InVision Post-Intervention	DHI Pre-Intervention	DHI Post-Intervention
1	Impaired 0/0 tests	Impaired 0/0 tests	16/100	4/100
2	Impaired 2/3 tests	Impaired 0/0 tests	66/100	2/100
3	Impaired 2/3 tests	Impaired 0/0 tests	20/100	0/100
4	Impaired 2/3 tests	Impaired 0/0 tests	54/100	4/100
5	Impaired 1/3 tests	Impaired 0/0 tests	44/100	2/100
6	Impaired 3/3 tests	Impaired 0/0 tests	58/100	12/100
7	Impaired 1/3 tests	Impaired 0/0 tests	42/100	14/100
8	Impaired 3/3 tests	Impaired 0/0 tests	62/100	10/100

## IMPLICATIONS

- Occupational therapists should incorporate occupation-based skills in visual perceptual rehabilitation post-concussion.
- Occupational therapists have the unique skills to evaluate and treat oculomotor deficits, cognitive deficits, and other physical symptoms that accompany concussions.
- Occupational therapists play a unique role in visual perceptual rehabilitation as the basis of the profession is to incorporate occupation-based skills into treatments.

## REFERENCES

