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**Presenting Today**

Sheryl Ryan, PhD, OTR/L  
Akemi McNeil, MA, OTR/L  
Kathlyn Decena, OTS  
Angie Higa, OTS  
Cristina Jones, OTS  
Ellery Lockwood, OTS



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## Objectives

At the end of this workshop, participants will be able to:

1. Discuss what is known about driving for teens with ADHD in the occupational therapy literature.
2. Use evaluation data to draw conclusions related to ADHD, executive function, sensory processing, and driving errors.
3. Apply the learning to create appropriate assessment plans and interventions for teenage clients who are starting to learn to drive.

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**Plan**

- Introduction
- Activity Analysis
- What is Known about ADHD and Driving

Break

- Exploratory Case Study
- Case Study Activity
- Driving Preparedness: Handbook for OTs
- Q&A




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**The Occupation of Driving for Teens**

It's an IADL (27)

- Freedom!
- Independence
- Building adult competencies
- Access to school, work, and community involvement
  - Occupational enabler (28)




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**Certified Driving Rehabilitation Specialists**

(CDRS)



- Already skilled at doing driving assessments and rehabilitation
- Mostly with older adults and acquired disabilities
- Are pediatric OTs connecting youth to CDRS ?

- ★ Who is a pediatric OT or COTA?
- ★ Is anyone a CDRS?

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### Activity Analysis

Driving is a complex task with many sub-tasks, client factors, and performance skills.

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### Activity Analysis

**What are some examples of sub-tasks for driving?**

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### Driving Sub-Tasks



- Turning the vehicle on/off
- Buckling a seatbelt
- Navigation
- Managing speed
- Attending and responding to signage
- Communicating with others

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### Activity Analysis

What functions are required for a person to safely drive a car?

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### Activity Analysis

A look at OTPF

- 1. Neuromuscular, Motor, and Movement Functions
  
- 1. Mental, Cognitive, and Sensory Functions

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### Activity Analysis

Neuromusculoskeletal  
Motor Functions  
Movement Functions

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### Activity

Note which OTPF terms that you believe might be required functions for the activity of driving.

Neuromusculoskeletal	Muscle Functions	Movement Functions
<ul style="list-style-type: none"><li>○ Joint mobility</li><li>○ Joint stability</li></ul>	<ul style="list-style-type: none"><li>○ Muscle Power</li><li>○ Muscle tone</li><li>○ Muscle endurance</li></ul>	<ul style="list-style-type: none"><li>○ Motor Reflexes</li><li>○ Involuntary movement reactions</li><li>○ Control of voluntary movement</li><li>○ Gait patterns</li></ul>

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### Activity

Areas that OT's should consider when addressing driving concerns

Neuromusculoskeletal	Muscle Functions	Movement Functions
<ul style="list-style-type: none"><li>○ Joint mobility</li><li>○ Joint stability</li></ul>	<ul style="list-style-type: none"><li>○ Muscle Power</li><li>○ Muscle tone</li><li>○ Muscle endurance</li></ul>	<ul style="list-style-type: none"><li>○ Motor Reflexes</li><li>○ Involuntary movement reactions</li><li>○ Control of voluntary movement</li><li>○ Gait patterns</li></ul>

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### Neuromusculoskeletal



Joint Mobility

Joint Stability

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### Muscle Functions



- Muscle Power
- Muscle Tone
- Muscle Endurance

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### Movement Functions



- Motor Reflexes
- Involuntary Movement Reactions
- Control of Voluntary Movement
- Gait Patterns

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### Activity Analysis

- Specific Mental Functions
- Global Mental Functions
- Sensory Functions

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### Activity

Note which OTPF terms that you believe might be required functions for the activity of driving.

Specific Mental Functions	Global Mental Functions	Sensory Functions
<ul style="list-style-type: none"> <li>○ Higher level Cognitive</li> <li>○ Attention</li> <li>○ Memory</li> <li>○ Perception</li> <li>○ Thought</li> <li>○ Sequencing Complex movements</li> <li>○ Emotional</li> <li>○ Experience of self &amp; time</li> </ul>	<ul style="list-style-type: none"> <li>○ Consciousness</li> <li>○ Orientation</li> <li>○ Temperament &amp; personality</li> <li>○ Energy &amp; drive</li> <li>○ Sleep</li> </ul>	<ul style="list-style-type: none"> <li>○ Visual</li> <li>○ Hearing</li> <li>○ Vestibular</li> <li>○ Proprioceptive</li> <li>○ Touch</li> <li>○ Smell</li> <li>○ Pain</li> <li>○ Temperature &amp; Pressure</li> <li>○ Taste</li> </ul>

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### Activity

Areas that OT's should consider when addressing driving concerns

Specific Mental Functions	Global Mental Functions	Sensory Functions
<ul style="list-style-type: none"> <li>○ Higher level Cognitive</li> <li>○ Attention</li> <li>○ Memory</li> <li>○ Perception</li> <li>○ Thought</li> <li>○ Sequencing Complex movements</li> <li>○ Emotional</li> <li>○ Experience of self &amp; time</li> </ul>	<ul style="list-style-type: none"> <li>○ Consciousness</li> <li>○ Orientation</li> <li>○ Temperament &amp; personality</li> <li>○ Energy &amp; drive</li> <li>○ Sleep</li> </ul>	<ul style="list-style-type: none"> <li>○ Visual</li> <li>○ Hearing</li> <li>○ Vestibular</li> <li>○ Proprioceptive</li> <li>○ Touch</li> <li>○ Smell</li> <li>○ Pain</li> <li>○ Temperature &amp; Pressure</li> <li>○ Taste</li> </ul>

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### Specific Mental Functions



- Higher Level Cognitive
- Attention
- Memory
- Perception
- Thought
- Sequencing Complex Movements
- Emotional
- Experience of Self & Time

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## Global Mental Functions



- Consciousness
- Orientation
- Temperament & Personality
- Energy & Drive
- Sleep

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## Sensory Functions



- Visual
- Touch
- Vestibular
- Proprioception
- Hearing

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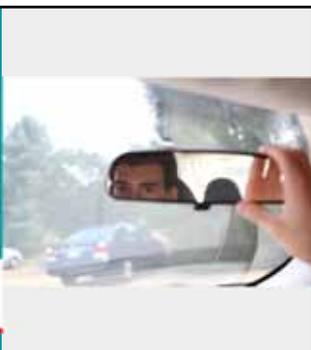
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Driving  
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Sub-tasks  
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Client Factors

Performance Skills for  
Clients with ADHD



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**Literature Review**



[www.books.com.au](http://www.books.com.au)

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**Literature Review**

Driving and its relation with:

- Teenagers
- ADHD
- Executive Functioning
- Sensory Processing



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**Teen Driving**



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- Extensive research in driving science
- Professor in variety of OT programs
- Editor-in-Chief of Occupational Therapy Journal of Research
- Editor and contributing author of *Driving Simulation for Assessment, Intervention, and Training*

Sherrilene Classen, PhD,  
MPH, OTR/L, FAOTA, FGSA

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### Risks of Driving for (all) Teens

- Higher rates of road traffic accidents and fatalities
  - Worldwide - Leading cause of death for people age 15-29 years (1)
  - USA - 1/3 of all teen and young adult deaths (2)
  - Young men 15-19 years (2)
- Higher rates of traffic citations




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### Risks of Driving for (all) Teens

- Factors related to increased traffic accidents for all teens (6)
  - Limited experience driving
  - Risky driving behaviors
  - Impaired driving
  - Distracted driving
    - Visual - texting
    - Manual - eating, texting
    - Cognitive - other teen passengers




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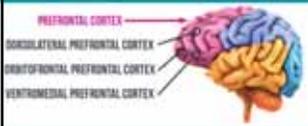
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## Neurology of the Teen Brain



- Brain maturation (3)
  - Prefrontal Cortex
- Amygdala and frontal lobe connection (4)
  - Emotions
  - Cognitive skills

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## Neurology of the Teen Brain



- Executive functions
  - 7 types
- Behavioral changes in adolescence (5)
  - Impulse control
  - Response inhibition
  - Sensation seeking

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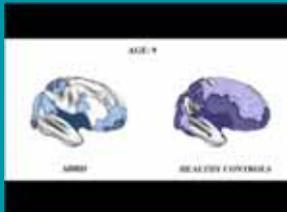
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## Areas of Concern for Children with ADHD (29, 30)



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**ADHD and Driving**



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**ADHD and Driving - Increased Risk Factors**

- 4x higher risk for accidents for teens with ADHD in North America (7)
- Less safe driving habits, greater frequency of license suspensions (15)
- Executive function problems correlate with more traffic citations and accidents (13)
- Impaired driving may be related to problems with the control of emotions and motor actions, rather than inattention (16)

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**ADHD and Driving - Increased Risk Factors in the simulator:**



**Speeding, scanning, total errors (8)**

- More accidents and lane maintenance problems (15)



**Distracted driving**

- More lane maintenance and speed constancy problems when texting than typical peers (11)



**Medication**

- Teens with ADHD who took their medication made fewer errors than unmedicated (12)

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### ADHD and Driving - Clinical Assessments

**Mixed findings for:**  
connection between ADHD and lower scores on visual, cognitive, and motor function measures (8,16)

**No connection between:**  
driving outcomes and performance based executive function tests (17)  
→ Trail Making Test (TMT) A and B, Backwards Digit Span (BDS)

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### Executive Functions and Driving

- Metacognition
- Initiation
- Inhibition
- Planning
- Decision making
- Impulse control
- Problem solving



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### Executive Functions and Driving

- Inhibition → attention, ignoring distractions
- Planning → route selection, merging, passing
- Decision making → navigating turns, driver interactions
- Impulse control → following distance, maintaining speed
- Problem solving → hazard management, construction zone

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### Executive Function and Driving

**Traffic accidents or citations for speeding, reckless driving, collisions, etc. (17, 19)**

- Low working memory
- Low planning
- Low inhibition (19, not 17)
- Slow reaction time (19)

\*Speeding is associated with low inhibition specifically

**Traffic citations, not resulting in accident (17)**

- Low inhibition
- Low task monitoring
- Low organization of materials

No associations found for emotional control, shifting, or monitoring with negative driving outcomes (17)

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### Executive Function and Driving

**Lane maintenance problems (19)**

- Low response inhibition
- Low verbal working memory
- Low attention

**Poor hazard detection (19)**

- Low inhibitory control



Young adults with inefficient EF are at risk for driving accidents immediately after licensure because the demands on controlled processes (vs. automatic) are prominent during the early stages of driving competence (18)

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### Sensory Processing and Driving



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### Sensory Processing

The way the nervous system receives messages from the senses and turns them into responses

- Sensory Systems
- Sensory Processing Disorder (SPD) – neurological "traffic jam" that prevents certain parts of the brain from receiving information needed to interpret sensory information correctly (26)



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### ADHD and Sensory Processing

- Children with ADHD have more sensory processing differences on all scales of the Sensory Processing Measure (SPM) than neurotypical peers. (21)
- Children with ADHD have lower scores for all four response patterns on the Sensory Profile (SP) than neurotypical peers. (22, 24)

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### ADHD and Sensory Processing

- ★ There does not appear to be a specific pattern of sensory processing and modulating for children with ADHD, however, there are clear sensory differences in ADHD. (24)

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### ADHD and Sensory Processing

Risky behaviors are related to higher sensory seeking and lower effortful control

- Having ADHD and sensory seeking patterns did not correlate with risky driving habits (23)
- Having ADHD and lower effortful control correlated with risky driving habits (23)

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### Summary

- Driving is an important occupation for teens
- Teens are at a greater risk in general
- Teens with ADHD have amplified risk for traffic accidents and citations
- OTs can provide skilled assessments and interventions that include executive function, sensory processing, and motor concerns

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### Implications for Practice:

*Multi-modal assessment and intervention (9)*

- Education
- Parent involvement
- Consider CDRS
- Simulator practice with instrumentation to record driving behaviors
- Additional on-road driving practice
  - Practice, practice, practice to increase automaticity
- Medication while driving (10)
- Consider a manual transmission (25)

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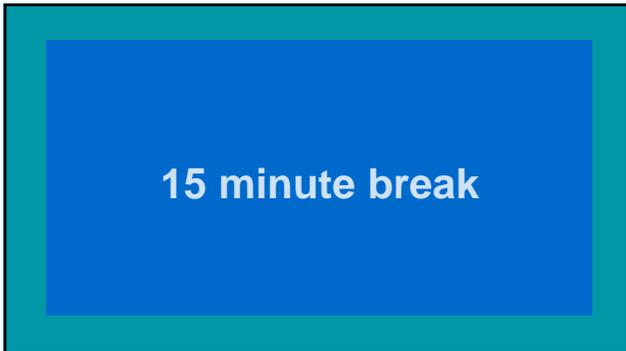
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**Plan**

- Introduction
- Activity Analysis
- What is Known about ADHD and Driving

Break

- Exploratory Case Study
- Case Study Activity
- Driving Preparedness: Handbook for OTs
- Q&A



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**Exploratory Case Study**



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### Research Question

What is the relationship between driving errors, executive function, and sensory processing for teens with ADHD?



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### Measures

- Intake forms
- Driving simulator
- AASP
- CEFI



4 pre-driving girls with ADHD

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### Standardized Intake Forms

**Teen Driving Form**

When did you first start driving? \_\_\_\_\_

How often do you drive? \_\_\_\_\_

In what conditions do you normally drive? (e.g., daytime, night, highways, etc.) \_\_\_\_\_

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Please rate your interest in driving.

1 2 3 4 5  
 Never Sometimes Often Always

Please rate how confident you feel when driving.

1 2 3 4 5  
 Not confident at all Very confident

Do you play video games? Yes No  
 If so, how many hours do you play a week \_\_\_\_\_ hours

- Participant background
- Diagnoses
- Medication
- Driving experience

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## STISIM Drive



- 5 trials
- Varying scenarios
- Driving errors
- High ecological validity (31, 32)

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## Adolescent/Adult Sensory Profile

- Participant self-questionnaire
- 5 point Likert scale
- Norm referenced
- 4 quadrants
- Good reliability & validity (33)



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## Comprehensive Executive Function Inventory (CEFI)



- 9 domains
- Strengths / weakness
- Norm-referenced data
- Excellent reliability & validity (34)

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**Interactive Case Study**



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**Activity - Case Studies**

4 Stations

- Visit each station
- Discuss
- Interpret the assessment results



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**Case Study Summary**



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## ADHD and Sensory Processing

There is a known connection between ADHD and sensory processing differences, but no clear pattern

- Two participants with low registration and sensory sensitivity
- Zero participants with sensory seeking
- One participant similar to others in all areas
- One participant different in 3 of 4 areas

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## Sensory Processing and Driving

The two participants who reported very low registration and sensory sensitivity also had more center line crossings and speeding

Quadrant	#1	#2	#3	#4
Low registration	Similar to most people	Similar to most people	Much more than most people	Much more than most people
Sensation seeking	Similar to most	Less than most	Similar to most	Similar to most
Sensory sensitivity	Similar to most	Similar to most	More than most	More than most
Sensation avoiding	Similar to most	Less than most	Similar to most	More than most

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## ADHD and Executive Function

There is a known connection between ADHD and executive function difficulties, but no defined pattern

- Participants had overall low Executive Functioning, especially:
  - Working Memory, Planning, and Attention
- Participants had significant variability on other CEFI subscales

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## ADHD and Executive Function

CEFI subtest scores <24 standard score:

All 4 participants

- Attention, working memory, planning

3 of 4 participants

- Emotional regulation, initiation, organization, self-monitoring

2 of 4 participants

- Flexibility, inhibitory control

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## Executive Function and Driving

There is a known connection between executive function difficulties and driving errors

- Our results did not show specific connections between executive function skills and types of errors
- The two participants with overall CEFI scores <9 (standard score):
  - #2 had the fewest simulator errors
  - #3 had the most simulator errors

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## ADHD and Driving

All participants increased driving accuracy with successive simulator practices

- One participant increased speeding errors with practice
- It is consistent with existing literature to recommend extensive practice and repetition to develop automaticity and safe driving habits

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## ADHD and Driving

It may be difficult to predict an adolescent's driving readiness based on AASP or CEFI scores

- Complete a full individualized assessment
- Consult or refer to a CDRS
- Educate parents and teens throughout the process

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## Practice Recommendations



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## Practice Recommendations



Pediatric OTs and CDRS

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### Practice Recommendations

Develop skills in executive function assessment and intervention



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### Practice Recommendations

Make sensory screening part of a pre-driving assessment for teens with ADHD



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### Practice Recommendations



Creatively expand OT services for youth 11-17 years

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**In Practice: ADHD and Driving Interventions**  
*Multi-modal assessment and intervention (9)*

- Education
- Parent involvement
- Refer to a CDRS
- Simulator practice with instrumentation to record driving behaviors
- Additional on-road driving practice
  - Practice, practice, practice to increase automaticity
- Medication while driving (10)
- Consider a manual transmission (25)

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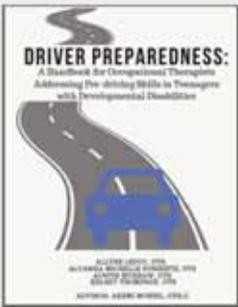
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**Driver Preparedness: Handbook for OT's**  
Addressing Pre-driving Skills in Teens with Developmental Disabilities



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**Driver Preparedness Handbook: Purpose**

GO-TO Introductory Resource  
Ideas and Information  
Support for Therapists

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**Driver Preparedness Handbook: Overview**

- Introduction
- Task Analysis
- Screening Tools and Assessments
- Intervention Suggestions
- Resources
- References

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**Driver Preparedness Handbook: Introduction**

Why is Driving Important?  
Driving and Teens with Developmental Disabilities  
Role of Caregiver

- Community Mobility
- Driving as an Occupation
- Mode of independence
- Pre-driving and Teens
- Safety
- Importance in caregiver participation



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**Driver Preparedness Handbook: Task Analysis**

Common areas of concern

- Client Factors
- Performance Areas

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Driving Skills	Performance Skills needed for Driving	Clinical Observations
Transferring in and out of the vehicle	<ul style="list-style-type: none"><li>Aligns</li><li>Bends</li><li>Coordinates</li><li>Initiates</li><li>Moves</li><li>Positions</li><li>Sequences</li><li>Stabilizes</li></ul>	<ul style="list-style-type: none"><li>Is the client steady moving from one surface to the next?</li><li>Will the client know how to adjust the seat settings to customize to their needs?</li></ul>

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### Driver Preparedness Handbook: Task Analysis Screening Items



- Transferring in/out of vehicle
- Preparation for driving
- Starting/turning off vehicle
- Speed Regulation
- Driving Etiquette
- Interacting with the Vehicle
- Maintaining car and understanding symbols

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### Preparing for Driving



- Accommodates
- Aligns
- Calibrates
- Flows
- Grips
- Handles
- Initiates
- Manipulates
- Positions
- Reaches
- Searches/locates
- Terminates

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## Speed Regulation

- Accommodates
- Attends
- Calibrates
- Coordinates
- Initiates
- Paces
- Positions
- Sequences



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## Driving Etiquette

- Approaches/starts
- Concludes/Disengages
- Expresses Emotion
- Gesticulate
- Heeds
- Looks
- Notices/responds
- Regulates
- Takes Turns
- Thanks



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### Driver Preparedness Handbook: Screening Tools and Assessments

- Cognitive skills
- Visual Skills
- Motor Skills
- Visual-Motor Skills
- Driving Specific Assessments

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### Driver Preparedness Handbook: Screening Tools and Assessments

Information Included:

- Assessment
- Description
- Target Population
- Where to find it

**Occupational Therapy: Driver Off Road Assessment (OT-DORA)**  
**Description:** Can be used as an off-road or on-road assessment. This assessment covers cognition, perception, sensory skills, behavior, and other driving skills.  
**Population:** Teenagers-Adults  
**Availability:** Found at AOTA Store

**Simulated Driving Assessments (SDAs)**  
**Description:** A virtual reality driving simulation assessment in which the individual drives a course and the computer detects any errors produced such as lane deviations and speed measurements.  
**Population:** Ages 18 years-old +  
**Availability:** Contact website for available options at [Simulator Systems International](http://Simulator Systems International)

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### Driver Preparedness Handbook: Assessment Flowchart

4 Skill Areas to Evaluate:

- Cognitive
- Visual
- Motor
- Visual-Motor Integration

Area of Deficit	Driving Error	Possible Assessments
<b>Impulse control/ self control</b>	<ul style="list-style-type: none"> <li>• Collisions</li> <li>• Stray into</li> <li>• Pedal in the</li> <li>• Stop sign tickets</li> <li>• Speeding tickets</li> <li>• Traffic light tickets</li> </ul>	<ul style="list-style-type: none"> <li>• Road Rating Scale</li> <li>• Simulated Driving</li> </ul>

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### Driver Preparedness Handbook: Assessment Flowchart

**FLOWCHART**  
**VISUAL SKILLS**

Area of Deficit	Driving Error	Possible Assessments
<b>Visual Attention</b>	<ul style="list-style-type: none"> <li>• Collisions</li> <li>• Missed Responses</li> <li>• Road Edge excursions</li> <li>• Speed Excursions</li> <li>• Stop sign tickets</li> <li>• Traffic light tickets</li> </ul>	<ul style="list-style-type: none"> <li>• DriveABLE</li> <li>• Simulated Driver Assessment (SDA(s))</li> </ul>

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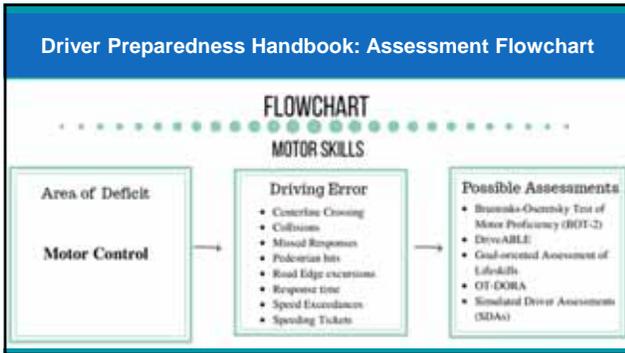
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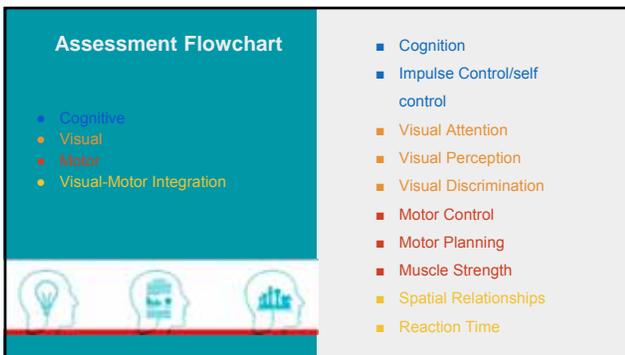
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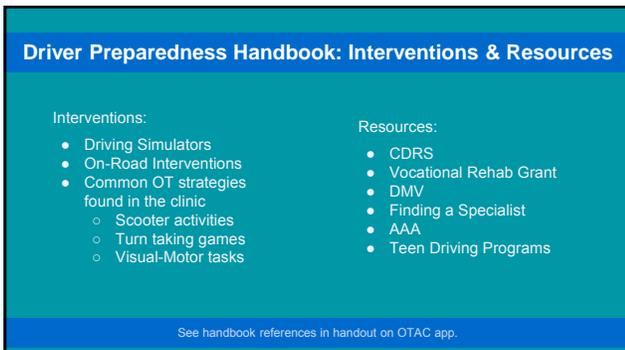
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### Driver Preparedness Handbook: Availability?

Coming soon!  
Currently in Review Process

Would you like to provide feedback?  
Grab a flyer to help out!

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# DRIVER PREPAREDNESS:

A Handbook for Occupational Therapists  
Addressing Pre-driving Skills in Teenagers  
with Developmental Disabilities



ALLYSE LEDUC, OTS,  
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# TASK ANALYSIS



## Driving Skills

## Performance Skills needed for Driving

## Clinical Observations

### Starting/Turning off vehicle

- Calibrates
- Chooses
- Flows
- Grips
- Handles
- Initiates
- Manipulates
- Moves
- Paces
- Reaches
- Sequences
- Stabilizes
- Uses

- Will the client have a key or push-start?
- Will the client be able to locate the correct key?
- Will the client be able to use a functional grasp with a key (e.g., lateral prehension grip)?
- Will the client know the correct sequence of starting the car or putting it back in park (e.g., automatic, manual, push-button start, and key ignition)?
- Does the client have appropriate in-hand manipulation skills with small objects such as a key?
- Does the client have steady arm movements when reaching?

### Speed Regulation

- Accommodates
- Attends
- Calibrates
- Coordinates
- Initiates
- Paces
- Positions
- Sequences

- Will the client be able to regulate speed in accordance to the environment and speed limit?
- Can the client use visual scanning while moving in vehicle to read speed limit signs?
- Does the client understand the vehicle's speedometer and react with appropriate ankle movements?



# TASK ANALYSIS



## Driving Skills

## Performance Skills needed for Driving

## Clinical Observations

### Driving Etiquette

- Approaches/Starts
- Concludes/Disengages
- Expresses Emotion
- Gesticulate
- Heeds
- Looks
- Notices/Responds
- Regulates
- Takes Turns
- Thanks

- Does the client have fluid movement when demonstrating ankle dorsiflexion and plantar flexion?
- Will the client be able to understand and obey the rules and laws of the road?
- Will the client be able to appropriately gesticulate and communicate with other drivers?
- Does the client understand the use of gesticulations (e.g., waving a hand to let other drivers pass) related to driving?
- Does the client understand the use of the car's horn and when it is appropriate?
- Will the client know to follow emergency-service etiquette (e.g., pulling off to the side of the road when an emergency vehicle passes by)?
- Will the client know when to use turn signals at appropriate times?



# TASK ANALYSIS



## Driving Skills

## Performance Skills needed for Driving

## Clinical Observations

Interacting with the vehicle  
settings

- Chooses
- Continues
- Coordinates
- Flows
- Grips
- Handles
- Manipulates
- Moves
- Positions
- Reaches
- Searches/Locates
- Sequences
- Stabilizes
- Uses

- Will the client be able to locate and interact with: turn signals, headlight settings, window settings, A/C settings, emergency hazards, and windshield wiper settings?
- Can the client use a functional grip with task objects (e.g., a turn dial for the A/C)?
- Can the client use stereognosis to locate appropriate task objects?
- Does the client know the function of the vehicle settings

Maintaining car and  
understanding symbols

- Adjusts
- Benefits
- Initiates
- Inquires

- Will the client be able to understand dashboard symbols and their implications on the vehicle (e.g., low oil, check engine, airbag, etc.)?
- Will the client be able to understand regular maintenance of a vehicle (e.g., changing tires, changing oil, refilling gas, etc.)?

NOTE: The OT should be familiar with updated technology in vehicles and how it can benefit or hinder a novice driver.



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**WROTSS 2020 – Driving, Teens, and ADHD: Between Group Data Comparison Table**

	Participant #1	Participant #2	Participant #3	Participant #4
<b>Comprehensive Executive Function Inventory (CEFI) parent report measure</b>				
<u>Overall Score*</u>	<b>Low Average</b> Percentile: 16	<b>Below Average</b> Percentile: 7	<b>Low Average</b> Percentile: 7	<b>Low Average</b> Percentile: 13
Attention*	Below average	Low average	Below average	Low average
Emotional Regulation	Average	Low average	Low average	Low average
Flexibility	Low average	Average	High average	Low average
Inhibitory Control	Average	Low average	<b>Well below average</b>	Average
Initiation	Low average	<b>Well below average</b>	Average	Below average
Organization	Low average	Below average	Below average	Average
Planning*	Low average	Low average	Low average	Below average
Self-Monitoring	Low average	Below average	Below average	Average
Working Memory*	Low average	Below average	<b>Well below average</b>	Below average
<b>CEFI data notes:</b>	<ul style="list-style-type: none"> <li>• Attention, planning, and working memory consistent for all 4 participants</li> <li>• Overall, EFs very impacted for our participants with ADHD</li> </ul>			
<b>Adolescent/Adult Sensory Profile (AASP) self-report measure</b>				
Low Registration	Similar to most people	Similar to most people	<b>Much more than most people</b>	<b>Much more than most people</b>
Sensation Seeking	Similar to most	Less than most	Similar to most	Similar to most
Sensory Sensitivity	Similar to most	Similar to most	More than most	More than most
Sensation Avoiding	Similar to most	Less than most	Similar to most	More than most
<b>AASP data notes:</b>	<ul style="list-style-type: none"> <li>• No clear pattern, must evaluate on an individual basis</li> </ul>			
<b>Driving Errors</b>				
<u>Total Errors</u>	3	2	12	3
Road Excursions	2	1	4	0
Collisions	1	1	5	0
Center Line Crossings (% of drive time)	0%	0%	11%	6%
Speeding (% of drive time)	0%	0%	5.5%	26%
<b>Driving Errors data notes:</b>	<ul style="list-style-type: none"> <li>• Errors decreased over trials (excl. P4's speeding)</li> <li>• May be driving overly cautious because lack of experience; problems may arise with small amount of experience when novice drivers start to feel more comfortable</li> </ul>			
<b>Interest vs. Confidence in Driving (0-5 scale) self-report measure</b>				
Interest	3	3	3	5
Confidence	2	0	0	3
Difference	1	3	3	2
<b>INT vs. CON data notes:</b>	<ul style="list-style-type: none"> <li>• All participants were more interested than confident, which may be unusual as over-confidence is usually hallmark of teens</li> </ul>			

*Normative sample data ranges for the CEFI- parent report.*

	Well below average	Below average	Low average	Average	High average	Superior	Very superior
Percentile	0-2	2-8	9-24	25-74	75-90	91-97	98-100

**WROTSS 2020 – Teens, Driving, and ADHD Case Study Data Sheets**

**Participant #1**

16 y/o female	ADHD, static encephalopathy	Stimulant medications	Pre-driver
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**Simulator scores:**

Total errors: 3

Types of errors: 2 road excursions, 1 collision, 0 center line crossing, 0 driving across center line or speeding

Observations: Very cautious. Errors decreased over trials.

**Adolescent/Adult Sensory Profile (AASP) scores:**

Low registration	Similar to most people
Sensory seeking	Similar to most people
Sensory sensitivity	Similar to most people
Sensation avoiding	Similar to most people

**Comprehensive Executive Function Inventory (CEFI) scores:**

Subscale	Percentile rank	Classification
Attention	8	Below average
Emotional regulation	27	Average
Flexibility	13	Low average
Inhibitory control	42	Average
Initiation	14	Low average
Organization	19	Low average
Planning	19	Low average
Self-monitoring	12	Low average
Working memory	12	Low average
Overall	16	Low average

**NOTES:**

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**Participant #2**

15 y/o female	ADHD, depression	Stimulant and anti-depressant medications	Pre-driver
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**Simulator scores:**

Total errors: 2

Types of errors: 1 road excursion, 1 collision, 0 center line crossing, 0 driving across center line or speeding

Observations: Very cautious. Errors decreased over trials.

**Adolescent/Adult Sensory Profile (AASP) scores:**

Low registration	Similar to most people
Sensory seeking	Less than most people
Sensory sensitivity	Similar to most people
Sensation avoiding	More than most people

**Comprehensive Executive Function Inventory (CEFI) scores:**

Subscale	Percentile rank	Classification
Attention	9	Low average
Emotional regulation	10	Low average
Flexibility	34	Average
Inhibitory control	19	Low average
Initiation	1	Well below average
Organization	4	Below average
Planning	9	Low average
Self-monitoring	8	Below average
Working memory	8	Below average
Overall	7	Below average

**NOTES:**

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**Participant #3**

14 y/o female	ADHD	No medication	Pre-driver
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**Simulator scores:**

Total errors: 12

Types of errors: 4 road excursions, 5 collisions, 11% time driving across the center line, 5.5% time speeding.

Observations: Errors decreased over trials, was very talkative and easily distractible

**Adolescent/Adult Sensory Profile (AASP) scores:**

Low registration	Much more than most people
Sensory seeking	Similar to most people
Sensory sensitivity	More than most people
Sensation avoiding	Similar to most people

**Comprehensive Executive Function Inventory (CEFI) scores:**

Subscale	Percentile rank	Classification
Attention	6	Below average
Emotional regulation	12	Low average
Flexibility	81	High average
Inhibitory control	1	Well below average
Initiation	45	Average
Organization	6	Below average
Planning	18	Low average
Self-monitoring	7	Below average
Working memory	1	Well below average
Overall	9	Low average

**NOTES:**

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**Participant #4**

14 y/o female	ADHD	No medication	Pre-driver
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**Simulator scores:**

Total errors: 3

Types of errors: 0 road excursions, 0 collisions, 6% time driving across center line, 26% time speeding

Observations: Percent of time speeding increased from 0 to 54% over 3 trials. Center line crossing decreased from 19% to 0 over 3 trials. Errors decreased over trials (except speed).

**Adolescent/Adult Sensory Profile (AASP) scores:**

Low registration	Much more than most people
Sensory seeking	Similar to most people
Sensory sensitivity	More than most people
Sensation avoiding	More than most people

**Comprehensive Executive Function Inventory (CEFI) scores:**

Subscale	Percentile rank	Classification
Attention	14	Low average
Emotional regulation	16	Low average
Flexibility	18	Low average
Inhibitory control	25	Average
Initiation	7	Below average
Organization	34	Average
Planning	8	Below average
Self-monitoring	25	Average
Working memory	8	Below average
Overall	13	Low average

**NOTES:**

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# Activity

Note which OTPF terms that you believe might be required functions for the activity of driving.

## Neuromusculoskeletal

- Joint mobility
- Joint stability

## Muscle Functions

- Muscle Power
- Muscle tone
- Muscle endurance

## Movement Functions

- Motor Reflexes
- Involuntary movement reactions
- Control of voluntary movement
- Gait patterns

# Activity

Note which OTPF terms that you believe might be required functions for the activity of driving.

## Specific Mental Functions

- Higher level Cognitive
- Attention
- Memory
- Perception
- Thought
- Sequencing Complex movements
- Emotional
- Experience of self & time

## Global Mental Functions

- Consciousness
- Orientation
- Temperament & personality
- Energy & drive
- Sleep

## Sensory Functions

- Visual
- Hearing
- Vestibular
- Proprioceptive
- Touch
- Smell
- Pain
- Temperature & Pressure
- Taste