

## Critically Appraised Topic Template

**Title:** *Occupational Therapy Driving Intervention Shows Emerging Evidence in Improving Civilian Driving Errors in OIF/OEF Combat Veterans with PTSD.*

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Date: 12/07/2016

### CLINICAL SCENARIO

#### Condition/Problem

Primary Medical Condition: Posttraumatic Stress Disorder (PTSD). PTSD occurs when a person relives a traumatic event he or she experienced or witnessed. This trauma results in recollections of the experience such as intrusive memories, flashbacks, or nightmares. PTSD is classified as an Anxiety Disorder in the DSM-5 (American Psychological Association, 2016). Experiencing PTSD often causes a person to present with anxiety in a harmless situation. Other symptoms include avoidant behavior, startle response, and can include changes in mood, cognition, and arousal (Classen et al., 2014a). The cognitive functions affected by PTSD such as attention, executive function, and processing speed may impact a person's ability to drive, which is one of the reasons why the ability to drive safely post-deployment is a concern for many combat veterans who are experiencing PTSD (Classen et al. 2014a).

- Residual Problems Associated with PTSD:
  - For certain veterans, reintegrating into civilian community after being in combat can be very difficult. When soldiers return home, some may experience a phenomenon where their thought processes are still centered on how to navigate the war. This state of mind is called combat mindset or battlemind phenomena. During military training, soldiers are taught to change their perception and find threats in everyday settings. Garbage on the side of the road is now seen as a potential bomb threat, every situation needs to be approached with caution, and a soldier needs to be prepared to fight at any moment in order to survive. Transitioning out of this mindset post deployment can be difficult for some combat veterans, which increases their risks of dangerous behaviors in civilian driving, putting themselves and others at risk for motor vehicle accidents (Hannold et al., 2013).
  - There are many other residual problems that can be associated with PTSD including marital/family issues, depression, drug/alcohol abuse, and problems sleeping. Although these issues may impact the occupation of driving, the focus of this critically appraised topic is driving problems related to combat mindset after returning home.

#### Incidence/Prevalence

According to the National Center for PTSD, in the general population, about 7-8% of people will

have PTSD at some point in their lives with 8 million adults having PTSD in a given year. As for the military, statistics indicate that 11-20% of veterans of Operation Enduring Freedom (OEF) or Operation Iraqi Freedom (OIF) have PTSD in a given year. This is comparable to 12% of veterans of the Gulf War and currently 15% of Vietnam veterans (30% within their lifetime) who experience PTSD in a given year (Gradus, 2016).

Between 2002-2015, reports indicated that 364,894 (55%) veterans of OEF, OIF and Operation New Dawn (OND) had been diagnosed with PTSD by VA facilities, this does not account for those who are not enrolled with VA health care (Department of Veterans Affairs, 2015).

The exact number of veterans with post-traumatic stress disorder is difficult to account for at any given point in time due to complications of accurately diagnosing all veterans who may be experiencing symptoms of the disorder (Department of Veterans Affairs, 2015). However, research indicates that young veterans of OIF and OEF report driving as one of the top five difficulties in occupational performance upon returning home from war (Plach and Sells, 2013). Participants reported feeling anxious and uncomfortable in motor vehicles, which affected their behavior on the road. Although there is limited data and research on how many veterans of OIF/OEF with PTSD experience difficulty with driving, it is becoming an emerging area of interest within occupational therapy.

### **Impact of the Problem on Occupational Performance**

All areas of occupation in the occupational therapy practice framework: domain and process have the potential of being disrupted by the diagnosis of posttraumatic stress disorder. PTSD affects the cognitive and socioemotional aspects of a veteran's life, impacting each individual differently. However, driving and community mobility has been found to be a difficult occupation for 93% of combat veterans diagnosed with PTSD when returning to civilian life (Classen, Monahan, Canonizado, & Winter, 2014b). Hannold et al. (2013) reported the second leading cause of death among OIF/OEF veterans (after suicide) was transportation accidents, and motor vehicle accidents were responsible for a large majority of injury/disability and visits to health care providers for these veterans. The occupation of driving requires the use of many specific and global mental functions for example attention, perception, thought, higher-level cognitive, and temperament to be performed safely and efficiently (American Occupational Therapy Association, 2014). A combat veteran diagnosed with PTSD may struggle with these cognitive functions resulting in poorer driving performance (Classen et al., 2014b).

In addition to the primary diagnosis of PTSD, the residual battlemind phenomena can also lead to unsafe driving performance on civilian roads. For driving war vehicles, soldiers are trained in different offensive and defensive driving skills that include driving in the center of the road, swerving to avoid objects, constantly scanning the environment, and speeding (Classen et al., 2014b). While these behaviors and skills are necessary to survive in a combat zone, they are dangerous to implement back in civilian life. People with PTSD often have increased anger, hyperarousal, and impulsivity that can contribute to unsafe driving and increased risk of getting in a motor vehicle accident (Amick, Kraft, & McGlinchey, 2013).

### **Intervention**

For Classen et al. (2014b), the intervention had three separate sessions, 1 hour each, that were lead by the OT. Session one focused on reviewing the errors that the participant made during their driving simulation and being educated on strategies to prevent these errors in the future. Session two involved visual search training for critical cues using a CD that showed pictures of US roads, cities, and intersections. The participant first identified war cues that they would attend to while driving in combat and then identified road cues they would attend to when driving on civilian situations. During session three, the veteran spoke about the roadway cues he learned in session two while driving the simulator. The intervention was the same for both of Classen's studies, but the timeframe in which the sessions were complete was different. For Classen et al. (2014b) all 3 sessions were administered within one week. Classen et al. (2014a) the 3 sessions were administered over a span of 6-8 weeks.

### OT Theoretical Basis

Dynamic interactional theory focuses on reorganizing a person's way of thinking in order to restore task performance skills. This theory is often used for people who have cognitive dysfunction of some form. In dynamic interactional theory, successful occupational performance is accomplished when a person has the ability to perceive and process all incoming information in order to plan how to achieve an action or task. This theory states that higher level of cognitive function is also necessary in order to complete functional tasks. These higher functions include having self-awareness, goal selection, planning steps to achievement, monitoring and evaluating performance, and problem-solving when confronting obstacles. This theory also has an occupational therapy platform that looks at the interaction between the person, activity, and the environment. This theory fits with the driving interventions for veterans with PTSD because it focuses on changing their mindset, or cognition, in order to improve their driving behaviors on civilian roads. In order to do this, the intervention focuses on improving cognitive skills, which may include problem-solving and monitoring, by utilizing interventions outlined in the theory such as anticipation of problems, self-evaluation, and self-questioning. It is hypothesized that when veterans with PTSD apply these interventions while driving on civilian roads, it will achieve the desired outcome of decreased driving errors (Cole & Tufano, 2008).

### Science Behind the Intervention

For the driving intervention within both studies, instant feedback was the mechanism of change utilized to decrease number of driving errors. While the participant is reviewing their driving simulation, they are informed by the occupational therapist of errors they made throughout and how to fix them. Then, the veteran provides his own verbal commentary on critical road cues through the simulation during a later session. This instant verbal feedback is utilized in order to improve on the analysis portion, or ability to interpretation and organization of info, of the information processing system for the combat veteran. If a veteran with PTSD has combat mindset, they are more likely to see a neutral stimulus within the civilian environment and interpret it as dangerous, leading to unsafe driving maneuvers. With instant verbal feedback from an external source, the veteran is able to properly associate stimuli as either dangerous or neutral. By having the veteran verbalize critical civilian road

cues on their own, it's allowing them to use their own cognitive analysis skills with the intention of changing their current information processing to successfully identify status of stimuli. It is then thought that the veteran will then use this information to change their driving accordingly. The goal of using continual verbal feedback from the OT and from the veterans themselves for this intervention is to internalize this feedback in order to change how the veteran perceives stimuli while driving. By internalizing this information, they will be able to automatically make correct decisions in how to address different road stimuli and decrease the number of driving errors they make due to having a combat mindset (Cole & Tufano, 2008).

### **Why is this intervention appropriate for OT?**

The driving intervention for combat veterans with PTSD described in this study is striving to improve driving and community mobility which is an important instrumental activities of daily living listed in the Occupational Therapy Framework (2014). The focus on the intervention is for the combat veteran to recognize and reduce number of driving errors that may be due to having a combat mindset, in order to be able to drive safely on civilian roads.

### **FOCUSED CLINICAL QUESTION: (PICO Question)**

Will occupational therapy driving interventions improve combat veterans of OEF/OIF with PTSD driving performance in civilian community?

### **SEARCH SUMMARY (review of search)**

A total of four databases were searched. Two relevant articles were located and both articles were critiqued. Classen et al. (2014b) was strong and Classen et al. (2014a) was fair. Literature on this intervention is very limited including only two studies currently published, which is why these two articles were the only ones critiqued for this paper.

### **CLINICAL BOTTOM LINE: (the answer)**

There is emerging evidence to suggest occupational therapy driving intervention can improve civilian driving errors in OIF/OEF combat veterans diagnosed with post-traumatic stress disorder.

**Limitation of this CAT:** This critically appraised paper (or topic) has been reviewed by occupational therapy graduate students and the course instructor.

### **TABLE 1: SEARCH STRATEGY**

Search Terms	Inclusion and Exclusion Criteria
Veterans PTSD Posttraumatic stress disorder Occupational Therapy Driving Interventions Combat Veterans Occupational Therapy Interventions	Peer reviewed journals Full text available

TABLE 2: SUMMARY OF STUDY DESIGNS OF ARTICLES RETRIEVED

Level	Study Design/ Methodology of Articles Retrieved	Total Number Located	Citation (Name, Year)
1a	Systematic Reviews or Metanalysis of Randomized Control Trials	-	
1b	Individualized Randomized Control Trials	-	
2a	Systematic reviews of cohort studies	-	
2b	Individualized cohort studies and low quality RCT's (PEDro $\leq 4$ )	-	
3a	Systematic review of case-control studies	-	
3b	Case-control studies and non-randomized controlled trials (quasi experimental or clinical trials)	2	<p>Classen, S., Cormack, N. L., Winter, S. M., Monahan, M., Yarney, A., Link Lutz, A., &amp; Platek, K. (2014a). Efficacy of an occupational therapy driving intervention for returning combat veterans. <i>American Occupational Therapy Foundation. Occupational, Participation and Health, 34(4)</i>.</p> <p>Classen, S., Monahan, M., Canonizado, M., Winter, S. (2014b). Utility of an occupational therapy driving intervention for a combat veteran. <i>American Journal of Occupational Therapy, 68</i>, 405-</p>

			411. <a href="http://dx.doi.org/10.5014/ajot2014.010041">http://dx.doi.org/10.5014/ajot2014.010041</a>
4	Case-series and poor quality cohort and case-control studies	-	
5	Expert Opinion	-	

**TABLE 3: STUDIES INCLUDED**

	Study 1	Study 2
<b>Design</b>	Case Study	Non-Randomized, Pre-test Post-test, Uncontrolled Trial
<b>Level of Evidence</b>	Strong (8/10)	Fair
<b>Rigor Score</b>	Preliminary evidence	Preliminary evidence
<b>Population</b>	U.S. OIF Combat Veteran with PTSD	U.S.OIF/OEF Combat Veterans with PTSD
<b>Intervention Investigated</b>	Occupational Therapy- Driving Intervention: Drive Safety DS-250	Occupational Therapy- Driving Intervention: Drive Safety DS-250
<b>Comparison Intervention</b>	No intervention	No intervention
<b>Dependent Variables</b>	Driving errors: Lane maintenance, vehicle positioning, signaling, speed regulation, visual scanning, gap acceptance, adjustment to stimuli, yielding, and total errors.	Driving errors: Lane maintenance, vehicle positioning, signaling, speed regulation, visual scanning, gap acceptance, adjustment to stimuli, yielding, and total errors.
<b>Outcome Measures</b>	Optec 2500 Visual Analyzer, Useful Field of View, MMSE, Trail-Making Test Part B, Foot Tap Test, and R LE ROM	"Visual, cognitive, sensory, and motor function tests (not further discussed)" and a standardized score sheet for seven driving errors in the mobile simulator
<b>Results</b>	Participant made 33 errors of 6 types at the pre-test and 9 errors of 3 types at post-test. There were no errors in signaling, visual scanning, gap acceptance, adjustment-to-stimuli, or response to triggers at post-test.	Statistically significant difference in errors for lane maintenance ( $p=.05$ ) and total driving errors ( $p=.03$ ) from pre-test to post-test.
<b>Effect Size</b>	Unable to calculate	Lane Maintenance: $d= -1.57$ Total Driving Errors: $d= -5.43$
<b>Conclusion</b>	The OT-DI was effective at reducing the number and type of driving errors made	There is potential efficacy of this OT-DI to reduce total number of driving errors and

	by this CV. Further research needs to be conducted in order to increase validity and generalizability.	improve lane maintenance for OEF/OIF CVs.
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**SYNTHESIS SECTION:**

**PICO Question:**

Will occupational therapy driving interventions improve combat veterans of OEF/OIF with PTSD driving performance in civilian community?

**Overall Conclusions:**

Skilled occupational therapy driving intervention for combat veterans with PTSD is a new area of study. Only two studies currently exist in the literature: a pilot case study and a follow-up pre-post test study with no control. There is a randomized control trial currently underway, but the results are not yet available. Therefore, the literature reviewed in this CAT is preliminary and low level evidence as there were less than 10 participants total in both studies combined.

The dependent variables for each study were seven driving errors (lane maintenance, vehicle positioning, vehicle scanning, speed regulation, adjustment to stimuli, gap acceptance, and signaling) assessed by an occupational therapist certified driving rehabilitation specialist (OT-CDRS) during a simulated driving test. The cohort study (Classen et al., 2014a) further refined two of the categories of driving errors: speeding errors and lane maintenance.

Immediately at posttest, both studies found the occupational therapy driving intervention resulted in a reduction of lane maintenance errors and total number of errors. The effect sizes of these changes are 1.57 and 5.43 respectively (Classen et al., 2014a). These effect sizes are extremely large and significant, indicating changes are clinically meaningful. This reduction was statistically significant (within group) for the cohort study (Classen et al., 2014a) for both error types and was also found in the case study (Classen, et al., 2014b) for both error types.

Vehicle positioning, signaling, visual scanning, and gap acceptance driving errors were found to decrease from pretest to posttest in the case study (Classen et al., 2014b). The number of errors committed in these categories decreased from pretest to posttest in the cohort study (Classen et al., 2014a) but not statistically significantly (within groups).

Other driving errors (speed regulation, adjustment to stimuli, and yielding) were not found to change from pretest to posttest in the case study (Classen et al., 2014b), nor were the reductions in these categories found to be statistically significant (within groups) in the cohort study (Classen et al., 2014a).

**Clinical Bottom Line:** There is preliminary evidence to suggest occupational therapy driving intervention reduced lane maintenance and total driving errors in combat veterans returned to civilian driving.

**Boundaries:**

A total of 9 male participants with an average age of 35.4 years old participated in the two studies. The participants were all combat veterans of OIF and/or OEF; years since discharge were

not reported. All participants had diagnoses of mTBI, PTSD, and/or orthopedic injuries. However, the orthopedic conditions did not physically impede the veterans' driving abilities. There was a history of driving citations and crashes amongst the participants within the three years prior to the study.

To be included in the study all participants had a valid driver's license, were community dwelling, and drove prior to injury/condition. Participants also had to receive a score of 24 of 30 on the MMSE indicating normal cognition and were able to complete a driving evaluation battery in order to be eligible for participation.

**Clinical Bottom Line:** The findings of the two studies are applicable to male combat veterans of OIF/OEF with specific diagnoses of mTBI, PTSD, and orthopedic injuries that are physically and cognitively able to drive. Generalizability of the results is also limited due to small sample size.

#### **Implications for Practice:**

The two research studies analyzed the effectiveness of an occupational therapy driving intervention for combat veterans. Combat veteran participated in a pre and posttest driving simulation using the DriveSafety DS-250r™ mobile driving simulator and received three therapy sessions addressing driving errors and adaptive strategies. Session one focused on the driving errors that were made in the pre-test. Session two focused on strategies to improve driving performance by comparing combat driving and civilian driving. In session three, the strategies learned from session two were applied by the CV while driving with the simulator. One-on-one intervention sessions lasted 60-90 minutes with varied duration between 1-8 weeks. All participants received between 180-270 minutes of occupational therapy driving intervention, despite the varying time frame. All sessions were conducted in the mobile simulator stationed in a parking lot of the clinic.

**Clinical Bottom Line:** There is preliminary evidence to suggest skilled occupational therapy driving intervention using the DriveSafety DS-250r™ mobile driving simulator will decrease driving errors of combat veterans with mTBI, PTSD, and/or orthopedic injuries returned to civilian driving immediately following intervention.

## REFERENCES

### Critiqued Articles

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Available at [www.UWLAX.EDU/OT](http://www.UWLAX.EDU/OT)



Classen, S., Cormack, N. L., Winter, S. M., Monahan, M., Yarney, A., Link Lutz, A., & Platek, K. (2014a). Efficacy of an occupational therapy driving intervention for returning combat veterans. American Occupational Therapy Foundation. *Occupational, Participation and Health*, 34(4).

Classen, S., Monahan, M., Canonizado, M., Winter, S. (2014b). Utility of an occupational therapy driving intervention for a combat veteran. *American Journal of Occupational Therapy*, 68, 405-411. <http://dx.doi.org/10.5014/ajot2014.010041>

### **Related Articles (Not Individually Appraised)**

Plach, H. L., & Sells, C. H. (2013). Occupational performance needs of young veterans. *American Journal of Occupational Therapy*, 67, 73–81. <http://dx.doi.org/10.5014/ajot.2013.003871>

Hannold, E. M., Classen, S. Winter, S., Lanford, D. N., & Levy, C. E. (2013). Exploratory pilot study of driving perceptions among OIF/OEF Veterans with mTBI and PTSD. *Journal of Rehabilitation Research and Development*, 50 (10), 1315-1330.

### **Other Related Information**

American Occupational Therapy Association. (2014). Occupational therapy practice framework: Domain and process (3rd ed.). *American Journal of Occupational Therapy*, 68(Suppl. 1), S1–S48. <http://dx.doi.org/10.5014/ajot.2014.682006>

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Gradus, J. L. (2016, February 23). Epidemiology of PTSD. Retrieved September 23, 2016, from <http://www.ptsd.va.gov/professional/PTSD-overview/epidemiological-facts-ptsd.asp>