Feasibility of a One-Day Driving Workshop for Combat Veterans During COVID-19

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Abstract

Background: Driving fatalities are a leading cause of death among combat Veterans. To improve Veterans' fitness-to-drive abilities, evidence-based interventions must be implemented.

Objectives: Assess the feasibility of a one-day driving intervention for combat Veterans.

Methods: The study objectives were examined using feasibility guidelines that examine recruiting capability; data collection procedures and outcome measures; acceptability and suitability of the intervention; available resources and participant responses.

Results: COVID-19 and the study's inability to convert to an online format (due to engagement with the driving simulator) hindered recruitment and study participation. Additional challenges for participants include fear of consequences from study participation, self-reflection of driving habits, workshop time burden, restrictive eligibility criteria and competing with another Veteran study.

Conclusions: Despite meeting criteria for feasibility success, COVID-19 posed difficulties the study was unable to overcome. As recruitment efforts evolve to an online format, targeted social media marketing may be considered.

Key words: COVID-19, veterans, automobile driving, feasibility studies, driving simulation

Key messages regarding feasibility

- Would a one-day driving simulator intervention be feasible among the Veteran population from the specific military operations.
- COVID-19 and the study's inability to convert to an online format (due to engagement with the driving simulator) hindered recruitment and study participation.
- As recruitment efforts evolve to an online format, targeted social media marketing may be considered.

Introduction

Motor vehicle crashes (MVC) are the second leading cause of death for combat Veterans from Operation Enduring Freedom (OEF), Operation Iraq Freedom (OIF), and Operation New Dawn (OND) (1). The risk of being involved in a MVC is higher for combat Veterans during their first six months after deployment and the risk increases with multiple deployments (2), and risk of death from a MVC is higher compared to non-deployed Veterans (3). Combat-related conditions such as posttraumatic stress disorder (PTSD) and mild traumatic brain injury (mTBI), well documented in the literature, further endanger driving performance (4-6). These conditions may lead combat Veterans to experience greater driving impairment when compared to the general population (4-6). Creating and implementing driving assessments and interventions to help improve combat Veterans' driving performance, is a needed strategy, but empirical interventions to do so are just appearing (5). To optimize evidence and time pertaining to a driving intervention, this study assessed the feasibility of a one-day driving workshop, developed from a randomized control trial (RCT) (5) to assess combat Veterans' driving performance and provide them with an intervention to reduce driving errors.

Literature Review

In the United States, personal vehicles are the preferred mode of transportation among the general population (7). Driving requires coordinated and integrated cognitive, visual/other sensory, and motor skills, all executed in a dynamic and complex environment to stay in control, responsive to the environment, and within the flow of traffic (8). Driving, an instrumental activity of daily living (IADL), is vital for autonomy, community participation, and societal integration (9). Hence, driving is a powerful facilitator of personal mobility and independence for most citizens, including combat Veterans.

Combat veterans.

Driving difficulties such as speeding, failing to signal, and changing lanes frequently or quickly are particularly common among combat Veterans. As a result, MVC and recurring citations are common among post-deployed combat Veterans (10). When compared to their non-deployed colleagues, combat Veterans have a higher rate of deaths and injuries (3, 4, 11). More specifically, MVC is more likely among combat Veterans in their first six months after returning from service, as well as for those who have served in several deployments (2). Due to the above driving difficulties, researchers often utilize driving simulators to assess combat Veterans' driving performance (12-14).

Simulator studies.

Compared to on-the-road evaluations, driving simulators are safer as they hold limited risk for adverse effects such as crashes and provide controllability, reproducibility, and scalability (15, 16). Simulators are useful tools for assessing driving performance and identifying driving errors in the Combat Veteran population, as we know they made more speeding errors and total driving errors on a high-fidelity driving simulator and had worse lifetime driving records when compared to a civilian control group (12, 17). Therefore, driving simulators may

be used as a plausible substitute for on-road studies, to assess and improve, the driving performance of this population. However, much research-related activities pertaining to this population has come to a halt as a result of the 2020 pandemic.

COVID-19 pandemic – challenges and strategies.

COVID-19 has significantly impacted all aspects of research, particularly recruitment and intervention delivery (18). Numerous obstacles present in ongoing research while investigators are also attempting to eliminate non-essential interaction to protect study participants and research personnel, alike. COVID-19 has had a particularly negative impact on underrepresented communities and their research engagement (19), especially given that marginalized communities are already difficult to reach. As a result of the pandemic, Veterans who demonstrate greater rates of anxiety, depression, PTSD, and psychological challenges, are also harder to recruit for research-related projects, specifically those living in rural or highly rural areas (20).

Rural areas.

Approximately 35.3 percent of Veterans live in rural or extremely rural areas with limited access to health and community services (21). Veterans face significant barriers to seeking and engaging in driver rehabilitation services including negative distance from a treatment facility, competing priorities/time constraints, limited driving rehabilitation services, and stigma or denial (22). Veterans living in rural and highly rural areas face even greater barriers to accessing and engaging in care, owing to the significant distance between them and a Veterans Health Administration facility (23).

Rational and Significance

161 War-related conditions and battle-mind driving tactics negatively impact post-deployed
162 Veterans' cognitive, visual, other sensory, and motor abilities (4), that adversely impact driving
163 performance. Consequently, combat Veterans are at a higher risk of being involved in MVC or
164 obtaining citations and violations than other civilians (4-6). The need for creating and
165 implementing driving assessments and interventions to identify and reduce driving errors, and
166 potentially MVC, is paramount. Empirical assessments and interventions utilizing driving
167 simulators are starting to emerge, as evidenced in an RCT (5). However, the RCT is not always
168 accessible to combat Veterans in rural areas, due to the two-year time commitment and the
169 impact of the COVID-19 pandemic. As such, a research approach that can overcome the
170 challenges and barriers associated with the RCT and the pandemic yet use the methodology of
171 the RCT in a succinct and secure way, is a reasonable option to develop new interventions.
172 Therefore, this one-day OT-DI was developed from an existing RCT that aims to help combat
173 Veterans identify and prevent/mitigate driving errors. As a result, and with the infrastructure of
174 the Veteran Administration's Office of Rural Health, this study assessed the fidelity of a one-day
175 driving workshop for rural post-deployed combat Veterans during the COVID-19 pandemic.

176 **Methods**

177 The study was approved by the institutional review board (IRB) at the University of
178 Florida, the North Florida/South Georgia VA Research Committee, and the VA Office of Rural
179 Health.

180 **Design**

181 A feasibility design to assess characteristics of a one-day driving workshop with combat
182 Veterans.

183 **Recruitment**

We enrolled combat Veterans: who met the following inclusion criteria: from OIF/OEF/OND, 19-70 years old, diagnosed with polytrauma (i.e., two or more combat-related conditions such as TBI, PTSD and/or orthopedic injury), drove prior to injury condition, had a valid driver's license or were eligible for one, and were community-dwelling, reported driving difficulties (e.g., history of citations, violations or other driving mishaps in real-world driving), and scored more than 24/30 on the Mini-Mental State Examination (MMSE).The exclusion criteria were: diagnosed with severe psychiatric (e.g., psychoses) or physical conditions (e.g., multiple amputees) that hinder their ability to drive, were advised not to drive by a physician due to effects of medications such as psychotropics, had severe, irremediable medical conditions (e.g., severe TBI) as per the consulting physician, were pregnant females or those planning pregnancy, and were currently receiving driver rehabilitation services.

Measures

The workshop collected data on driving related measures. The independent measures included health and driving questionnaires; Fitness-to-Drive Screening (FTDS; (24); Propensity for Angry Driving Scale (Road rage questionnaire; (25)); Community Integration Questionnaire (26); Satisfaction with Life Questionnaire (27); and Community Reintegration (28) (Military to Civilian Questionnaire). The dependent measure was driver risk perception (Dahlen & Ragan, 2004), simulator driving errors, and community integration (Sayer et al.).

Procedure

Eligible combat Veterans who completed the informed consent attended the one-day driving workshop, which lasted approximately 3 hours. All workshops were held in a private room, and in the Dodge Sprinter van with the DriveSafety DS 250 (DriveSafety, 2014) simulator engineered in the back of the van's cargo area. The workshop consisted of a driver fitness and

community mobility intervention, covered over a total of five parts (Table 1), conducted by a driver rehabilitation specialist (DRS) and multiple team members.

To assess the acceptability of the intervention, a qualitative interview was administered with each combat Veteran over the phone 1-2 weeks post-workshop. The semi-structured qualitative interview covered the following topics with combat Veterans: 1) barriers and facilitators to receiving the intervention and utilizing learned skills, 2) feedback about improving the intervention, and 3) satisfaction with the intervention.

<Insert Table 1 about here>

COVID-19 procedure.

With the start of the pandemic, the study protocol was modified to incorporate the COVID-19 guidelines and recommendations. The Department of Veterans Affairs issued N95's for each researcher and participant in the study. Researchers, as well as participants, were instructed to use hand sanitizer Social distancing was enforced by allowing no more than two people in a standard examination room. While Parts 2 and 3 from the workshop were planned to take place as small groups saving time and resources, it was changed to accommodate one participant at a time to allow for social distancing. As the driving simulator was contained within a small space, interactions in the simulator were reduced from 30 minutes to 15 minutes to ensure participant safety from COVID-19. The VA mandated the use of air conditioning (AC) with a fan turned up and in refresh mode when using the driving simulator van. All contact surfaces, including the simulator, were disinfected between visits.

Driving simulator.

The acclimation drive, simulated driving performance assessment, and driving intervention occurred in the DriveSafety DS 250 mobile simulator. The driving simulator

230 scenario consisted of one right turn, two left turns, three straights, and "triggers" that could elicit
231 driving errors, such as swerving for dead animals or speeding as a result of hearing a helicopter
232 overhead, spaced out throughout the drive. The acclimation drive and scenario were described in
233 detail in the RCT study (5). While the combat Veterans completed the City and Highway Driving
234 Scenario, the DRS observed and recorded driving errors (i.e., lane maintained, signaling, visual
235 scanning, speeding, vehicle positioning, adjustment to stimuli, gap acceptance, and yielding)
236 utilizing the driving performance assessment scoring sheet (29).

237 **Figure 1: DriveSafety 250 Driving Simulator Engineered in the Back of the Dodge Sprinter**
238 **Van**

239 <Insert Figure 1 about here>

240 **Drive Focus™.**

241 The study used Android tablets to administer the Drive Focus™ training (Figure 2). The
242 training consisted of identifying critical roadway information via a user interface and the
243 difficulty is graded based on a game-like scoring system (30). Drive Focus™ has been validated
244 in prior studies to indicate correspondence with improvements in detecting critical roadway
245 information and decreases in making driving errors (31).

246 **Figure 2: Drive Focus™ App with an Example of Identifying Critical Roadway**
247 **Information**

248 <Insert Figure 2 about here>

249 Researchers securely extracted subject data from the online Drive Focus™ Data
250 Analytics platform. The research team used SPSS 25.0 (IBM Corp., Armonk, New York) to
251 analyze the Drive Focus™ data.

252 **Feasibility Analysis**

253 Feasibility was assessed using the Orsmond & Cohn (2015) objectives and guiding
254 questions. As defined by the National Institute of Health Research (NIHR), a feasibility study is
255 used to determine whether the study itself can be done, by examining the research and
256 intervention process (NIHR, 2012). Feasibility studies precede pilot studies that focus on
257 outcomes (NIHR, 2012; Orsmond & Cohn, 2015). The objectives evaluated within feasibility
258 are: 1) recruitment capability, 2) data collection procedures and outcome measures, 3)
259 acceptability and suitability of the intervention, 4) resources available to manage study, and 5)
260 participant responses to the intervention (32). Feasibility objectives and guiding questions are
261 displayed in Table 2.

262 <Insert Table 2 about here>

263 **Feasibility Results**

264 **Recruitment Capability**

265 An array of recruitment efforts were made, including attending community events,
266 visiting Veteran and TBI-specific health clinics, flyer distribution, HealthStreet (local
267 recruitment organization), and widespread email flyer distribution (Table 2). In total, 1,258
268 recruitment attempts were made, which resulted in 113 responses from community members,
269 health professionals, and combat Veterans.

270 <Insert Table 3 about here>

271 Despite the extensive recruitment efforts, only 12 combat Veterans showed interest in the
272 study and were assessed for eligibility. Of those 12, only 5 screened eligible for the study. Out of
273 the five eligible participants, three were lost to attrition and two completed the workshop. After
274 the study was closed, an additional five participants made contact showing interest in the study

but were referred to another study. To assess the feasibility of this study recruitment efforts, the eligibility criteria, reasons for participation refusal, and obstacles to recruitment, were examined.

Eligibility criteria.

As rural Veterans are already a hard-to-reach population, the addition of polytrauma and specific operations (OEF/OIF/OND), in the middle of the pandemic, may have created eligibility criteria that was too restrictive. Another research project with a similar recruitment population occurred simultaneously to this study, which may have caused infringement on an already small participant pool. Finally, the inclusion of OEF/OIF/OND rural Veterans, most likely includes a younger adult population, for whom common convenience recruitment efforts may not be as user-friendly compared to older cohorts.

Reasons for participation refusal.

Veterans' reasons for not participating in the workshop included COVID-19, fear of consequences from participating in the study, and self-reflection of their current driving habits. Many combat Veterans did not think the compensation for participating in the study outweighed the risk of possibly contracting COVID-19, despite extensive measures to ensure researcher and participant safety. Other Veterans did not want to participate because they chose not to wear a N95 mask—and as per university and VA protocol, had to be excluded from the study. The second reason for refusal included fear of consequences for participating in the study, specifically that their driver's license could be revoked because of poor performance during the simulated driving assessment. Despite reassurance of anonymity and non-reporting to the department of motor vehicles, this fear persisted. Finally, some combat Veterans did not see the workshop as beneficial as they did not perceive themselves as having "impaired" driving performance.

298 **Obstacles to recruitment.**

299 The main obstacle to recruitment efforts and study participation included the mandates,
300 implications, and effects associated with the COVID-19 pandemic. During the study, the
301 university and the VA placed a hold on all research activities. Despite the hold, the funding
302 timeline remained unchanged, reducing the amount of time available for recruitment. After
303 research resumption began, additional safety precautions were mandated to conduct research.
304 The study protocol and workshop had to be significantly changed to accommodate social
305 distancing and COVID-19 safety guidelines. These protocol changes had to be approved by the
306 university and the VA, further reducing the time to recruit and conduct the study. COVID-19
307 created barriers and made a hard-to-reach population even more difficult to connect with.
308 Additionally, COVID-19 made it difficult to network and build relationships with stakeholders
309 as many organizations were closed, only working remotely, or not allowing in-person visits
310 when they did become operational again.

311 **Data Collection Procedures and Outcome Measures**

312 ***Participants.***

313 Overall participants understood questions asked and did not have difficulty operating the
314 driving simulator after instructions. Due to COVID-19 safety protocol, participants were
315 required to wear N95 masks, which anecdotally we have observed to be associated with the onset
316 of simulator sickness among combat Veterans.

317 **Acceptability and Suitability of Intervention**

318 To complete the questionnaire, driving simulation, and interview, participants were
319 required to dedicate 4 to 5 hours to the workshop. Although this workshop was created to reduce
320 the time burden from another driving intervention that required multiple site visits from

321 participants (5), it may still be a one-time burden for Veterans. The workshop was also only held
322 during weekdays, which could have caused a barrier to Veteran participation due to potential
323 interference with work schedules.

324 **Available Resources**

325 Feasibility assessment of available resources includes examining of the research team's
326 administrative capacity, advanced technology (DriveSafety DS250) and equipment (Drive
327 Focus™), expertise, skills, space, and time to conduct study. For this study, the research team
328 included seven members with a variety of skill sets. With the study team's administrative
329 capacity, technology and equipment, expertise, and skill sets, the study had a competent team to
330 execute the study.

331 **Space.**

332 The driving simulator, located within a Dodge Sprinter 2008 van, allowed workshop
333 participation to have greater accessibility, as the simulator could be driven to the Veterans'
334 location, versus them having to travel to the site of the study team. Although the simulator van
335 improved accessibility, having to reserve rooms for Veterans to participate in completing
336 questionnaires, the qualitative interview, and the Drive Focus™ training, created logistical
337 barriers and caused delays in scheduling workshops. COVID-19 safety protocol also exacerbated
338 this issue as more space was required so Veterans and the research team could assure social
339 distancing.

340 **Timeline.**

341 The study received VA funding for one year. The study did not receive IRB approval
342 until 12 months and as such a no-cost extension was initiated. VA-funded research is required to
343 receive IRB approval by the VA and then again by the university. This delay in IRB approval

was caused by COVID-19 and stopping all research activities including IRB approval. When research was allowed to continue, it was done in a tiered process. Although the university was allowed to begin conducting research, the VA did not approve resumption of research activities until a couple of weeks later. Although the research was allowed to begin, the VA and university IRB had to be amended to include COVID-19 safety procedures. After all administrative and IRB procedures were completed, the study had to be conducted in the no-cost extension time period. Even with an additional no-cost extension, the research team could not meet the recruitment goal. It is difficult to assess the recruitment feasibility of this study timeline due to COVID-19 delays and participant hesitancy.

Participant Responses

Feasibility objectives examining data from participants could not extensively be assessed as there were only two participants who enrolled in the study.

Discussion

This study assessed the feasibility of a one-day driving workshop for rural Veterans using objectives from Orsmond & Cohn (2015). The study was made up of a strong and diverse research team that had expertise to complete the study. Despite the study's extensive recruitment efforts, the study did not meet its goal of enrolling 30 participants. Obstacles that reduced the feasibility of this study included: too narrow inclusion criteria, time burden on participants, Veterans' perceptions about their current driving habits, and fears of consequences of participating in study. Although these factors reduced the feasibility of the one-day driving workshop, it is still plausible that the study would be successful despite these limitations. After examining the feasibility objectives, this study concludes that the COVID-19 pandemic created more barriers that made the study impractical. The COVID-19 pandemic reduced the

timeline available for the study to be completed, increased IRB regulations, delayed IRB approval, required additional study space for social distancing, increased chances of simulator sickness with N95 mask requirements, and increased the perceived risk of the study from combat Veterans (i.e., contracting COVID-19).

The COVID-19 pandemic impacted all aspects of research, requiring researchers to adapt and be innovative in their approaches (18, 19, 33-36). Adaptations were not limited to only one aspect of a study, but more likely affected all aspects of the study, including research infrastructure, funding and staff, enrollment goals, recruitment strategies, data collection and interpretation (18, 19, 33-36). To overcome many of these barriers, researchers moved their studies from face-to-face to e-research (33, 35, 36). COVID-19 further transformed the research landscape by highlighting what aspects of data collection was essential versus aspirational (19). Innovations to data collection include shipping study materials to participants, online assessments, and video conferencing (18, 19, 33-36). Typical convenience recruitment methods, such as placing recruitment materials in clinical and public settings, had to shift to remote recruitment efforts (i.e., mail, email, social media, paid advertisements, online town halls or community events) (18, 19, 33-36). Finally, the pandemic disempowered rural and marginalized populations to experience more health inequities and who had limited access to the required technological tools to participate in e-research (19, 36).

Conclusions

This study was limited in its ability to fully adapt to an e-research approach, as it required participants to interact with a driving simulator that could not be adapted to an online-only format. Device-related research and trials were especially vulnerable to disruption caused by the COVID-19 pandemic (19). Despite recruiting in clinical and public settings and including

various and rigorous remote efforts (i.e., mail, email, list-servs, online community events, social media), the study was unable to reach its target population to meet enrollment goals. To improve recruitment efforts, specifically for this hard-to-reach population, additional efforts such as allocating funds for paid and targeted advertisements on social media and search engines (Google, Facebook, Instagram) and paying influencers within that population to promote the study, may be considered. As researchers continue to study the health outcomes of younger Veteran populations (i.e., Millennials and Generation Z) recruitment efforts need to shift to have a strong online presence.

Abbreviations

MVC: Motor vehicle crashes

OEF: Operation Enduring Freedom

OIF: Operation Iraq Freedom

OND: Operation New Dawn

PTSD: Posttraumatic stress disorder

mTBI: Mild traumatic brain injury

RCT: Randomized control trial

IADL: Instrumental activity of daily living

IRB: Institutional review board

MMSE: Mini-Mental State Examination

FTDS: Fitness-to-Drive Screening

DRS: Driver rehabilitation specialist

AC: Air conditioning

NIHR: National Institute of Health Research

Declarations

Ethics Approval and Consent to Participate

The study was reviewed and approved by the North Florida / South Georgia Veterans Healthcare System (IRBNet) and the University of Florida's IRB.

Consent for Publication

Not applicable.

Availability of Data and Materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Competing Interests

The authors of this study have declared there are no potential conflicts of interests in regards to the research, authorship, and publication of this article.

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Authors' Contributions

SC obtained IRB approval, supervised the research team and oversaw all the main research functions. NS assisted with study administration including oversight of the team, coordination of workshops and delivery of qualitative interviews, recruitment, data collection and data analysis, in addition to manuscript writing. SW developed qualitative questionnaires and oversaw the qualitative aspects of the research study. MJ assisted primarily with the simulator portion of the workshop interventions as well as consenting, in addition to manuscript writing. IW assisted with marketing and recruitment of participants, administrative tasks and

qualitative data collection, as well as manuscript writing. All authors read and approved the final manuscript.

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Figures

Figure 1

DriveSafety 250 Driving Simulator Engineered in the Back of the Dodge Sprinter Van

Figure 2

Drive FocusTM App with an Example of Identifying Critical Roadway Information

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

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