

Determining skill transferability of action games as a method to reduce in-vehicle phone distractions

M. Rupp*, D.S. McConnell, and J.A. Smither

Technology & Aging Laboratory, Psychology Department, University of Central Florida, 4000 Central Florida Blvd. Orlando, FL 32816-1390, USA

Abstract. Distracted driving has been shown to be a safety issue in numerous studies. To combat this problem, in-vehicle technology, legislation, media interventions, and other methods have been proposed and attempted. However research indicates that the drivers themselves may circumvent, ignore, or not be able to react in time for these interventions to be effective. Therefore research into training programs for drivers may improve reaction time under distraction. Research indicates that action game players have faster reaction times and more attentional resources than non-players on paper-based tests. However, transferability to driving has not been studied yet. This paper outlines a study to determine if action game players perform better at a driving task based on frequency of game-play. Participants will be placed into two groups of play (high vs. low) and tested against two levels of distraction (none vs. phone conversation). It is expected that participants who play higher frequency of action games will perform better under distraction than lower frequency players. Driver performance, conversation recall, frequency and durations of eye fixations will be analyzed based on previous research which has validated those variables as a measure of distraction and higher workload.

Keywords: Driver-Distracted, Divided-Attention, Transportation

1. Introduction

The topic of distracted driving and mobile phone use has increased in importance in recent years as owning a mobile phone has become more pervasive in society. Ironically, new mobile phone users often cite safety as a chief reason and concern for purchasing a wireless phone since they are a source of distraction [7-8]. This indicates many people may ignore dangers of phone use and driving. Many driving and phone studies within the last 10 years indicate that the two activities, when performed concurrently, decrease performance and create distractions for the driver [2, 8]. Lack of attentional resources is a main reason for this distraction [8]. The current solution to this problem is to increase vehicle automation to compensate or to prevent phone use; however, these methods may still be ineffective [9]. In

order to find effective interventions that will reduce crash risk, it is helpful to look at expert populations. One such potential population is action video game (AVG) players. The reason that this group may be considered experts is that research shows that this group is more likely to perform better under distraction [4-5]. Further research shows that AVG players utilize their cognitive resources more efficiently than non-players do and are better able to resist the effects of phone-induced distraction. These results have been found in both correlational and experimental studies [4-5]. AVGs are used for research because they require players to constantly monitor their periphery for unpredictable events that require immediate attention forcing players to scan the environment. These characteristics may improve player spatial abilities and attentional skills through game-play [4,5]. Although, psychometric tests indicate these

* Corresponding author: Michael Rupp, e-mail: mrupp@knights.ucf.edu.

findings, little research exists in the literature that has examined differences on transferability to real world tasks and some of the research that has been conducted has failed to find significant effects. Durlach et al. (2009) were unable to find any significant differences between AVG players and non-players during a military monitoring task for change detection although they were able to on psychometric tests of change detection [3]. More research is needed to determine if the performance differences shown in laboratory tests really do transfer into real world tasks such as driving. McKay and Maki suggest that AVGs would be an appropriate training program to use with all ages to improve driving skills [6]. However, before training programs are developed, research must prove that these skills transfer to driving tasks.

2. Methods

The proposed study will examine the effects frequency of playing action games have on driver performance. This study hopes to confirm previous findings that AVG players have improved visuospatial abilities and attentional capacities. In order to examine these claims, first participants will be given the Card Rotation Test and Paper Folding Test. Next, they will be asked to drive in a simulated environment. This study is a 2x2 repeated measures factorial design comparing amount of AVG play (Light and Heavy) with the presence of a distracter condition (no conversation or conversation). Light frequency players are used instead of non-players to limit self-selection issues and light players will be the lowest third of responders on a prescreening survey and heavy players will be the top third responders. Changing lanes without signaling or driving off the roadway, collisions, and visual scanning patterns (location and duration of fixations) will be analyzed to determine performance. Participants will be prescreened to determine eligibility in the study and only participants who have corrected normal vision and do not have risk of motion sickness will be used.

3. Expected results

Since previous research has shown significant effects indicating AVG players have increased attentional stores, faster processing ability with distractors present and higher spatial abilities [4,5]. It is hy-

pothesized that the action gamers will scan the visual scene more and have better driver performance than non-players even under distraction.

4. Discussion

Significant findings of this study would indicate that action games may be appropriate as part of training programs designed to increase attentional capacity and increase performance under distraction which is important in many areas including driving. Future research would be able to determine more causal relationships between action games and performance on real world tasks.

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