Robotic surgery uses innovative technology to transcend a surgeon's skills when performing complex procedures. Currently, the only FDA-approved robotic system is Intuitive's da Vinci Surgical System. While this system offers many advantages over other minimally invasive techniques, it also introduces a need for specialized training. Virtual reality simulators have emerged as valuable tools for standardized and objective robotic surgery skill training and assessments. In recent years, the idea of using video game technology in surgical education for laparoscopy has also been explored, however few have attempted to make a connection between video game experience and robotic surgical skills. Thus, the current study aims to examine the performance of video gamers in a virtual reality robotic surgery simulator. Furthermore, the video gamers' performance was compared to that of medical students, expert robotic surgeons, and "laypeople." The purpose of this study is to demonstrate that video gamers acquire perceptual and psychomotor skills through video game play, similar to those used by robotic surgeons.

Subjects completed a demographic questionnaire and performed three computer-based perceptual tests: a Flanker compatibility task, a subsidizing task, and a Multiple Object Tracking test. Participants then performed two warm-up exercises on the Mimic dV-Trainer to familiarize themselves with the system and eight trials of two core exercises to test their skills. After completing all trials, participants completed a post-questionnaire regarding their experience with the system.

Expert video gamers (n=40), medical students (n=24), laypeople (n=42) and expert robotic surgeons (n=16) were recruited. Medical students and gamers were significantly faster than experts in the Flanker Task. The experts were significantly slower than all other groups in the subsidizing task. Experts scored significantly higher, were significantly more efficient, and were significantly faster than laypeople, medical students, and gamers in the first trial of Ring & Rail 1 and Suture Sponge. In trial eight of Ring & Rail 1, experts scored significantly higher and were more efficient than laypeople. Experts were also significantly faster than all other groups. Experts scored significantly higher than laypeople and gamers in trial Suture Sponge. Experts were significantly more efficient and significantly faster than all other groups.

Contrary to prior literature in laparoscopy, this study was unable to validate enhanced abilities of video gamers in a robotic surgery simulator. This study does further demonstrate that the transfer of skills developed through video game play is relevant to the surgical technique. This may be due to the differences of the systems and how the users interact within them. In a society where video games have become an integral pastime, it is important to determine the role that video games play in the perceptual and psychomotor development of users. These findings can be generalized to domains outside of medicine that utilize robotic and computer-controlled systems, speaking to the scope of the gamers' abilities and pointing to the capacity within these systems.

Major: Modeling and Simulation

Educational Career:
Bachelor's of Psychology, BS, 2012, The University of Central Florida
Master's of Modeling and Simulation, MS, 2013, The University of Central Florida

Committee in Charge:
Charles Hughes, Chair, College of Engineering and computer science
Peter Kincaid, UCF-IST
Juan Cendan, UCF College of Medicine
Roger Smith, Florida Hospital

Approved for distribution by Charles Hughes, Committee Chair, on November 5, 2015.
The public is welcome to attend.