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"TELE-NEUROREHABILITATION: POTENTIAL FOR TREATMENT AND ASSESSMENT"

JESSIE MANN

DELUCA LAB
NEUROMOTOR RESEARCH CLINIC
FRALIN BIOMEDICAL RESEARCH INSTITUTE
AT VTC

TRANSLATIONAL BIOLOGY, MEDICINE, AND HEALTH GRADUATE PROGRAM

Virginia Tech's Translational Biology, Medicine, and Health (TBMH) program is a research-intensive, integrative, and multidisciplinary doctoral program in the biomedical and health sciences. The program brings together students and faculty from the life, behavioral, physical, engineering, mathematical, and computational sciences to consider today's major challenges in health and disease. The program seeks to develop a new generation of research scientists and thought leaders, who are prepared to identify and tackle the complex challenges for improving human health, by making and translating discoveries into preventions, diagnostics, treatments, cures, and healthier behaviors.

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CONTACT THE TRANSLATIONAL BIOLOGY, MEDICINE, AND HEALTH GRADUATE PROGRAM:

MICHELLE THEUS, PH.D.

Co-Director, TBMH
Associate Professor,
Biomedical Sciences and Pathobiology
(540) 231-0909
mtheus@vt.edu

STEVEN POELZING, PH.D.

Co-Director, TBMH
Associate Professor,
Fralin Biomedical Research Institute
(540) 526.2108
poelzing@vtc.vt.edu

TBMH.VT.EDU

JESSIE MANN

- *HOMETOWN:* Lexington, VA

- *UNDERGRADUATE DEGREE:*
  Psychology
  Washington and Lee University

- *MENTOR:* Stephanie DeLuca, Ph.D.

- *COMMITTEE MEMBERS:*
  Konark Mukherjee, Ph.D.
  Martha Ann Bell, Ph.D.
  Michael Fox, Ph.D.
  Daniela Corbetta, Ph.D.

- *EX OFFICIO COMMITTEE MEMBERS:*
  Michael J. Friedlander, Ph.D.
  Michelle Theus, Ph.D.
  Steven Poelzing, Ph.D.

- *HONORS:*

  - Roanoke Graduate Student Association, Special Delegate to Graduate Student Association, 2018-2019. Vice President (2017) and President (2018) Iota Delta Rho: Interdisciplinary Research Honor Society, Virginia Tech
  - Mann, J., No, J., Polys, N. Isomorphic Avatar Based Therapy. 3rd place Faculty Choice Research Award, Department of Computer Science, Virginia Tech, Blacksburg, 2016.
  - Mann, J., Polys, N., Diana, R., Ananth, M., Herald, B., Patel, S. Virginia Tech's Study Hall: A Virtual Method of Loci Mnemotechnic Study using a Neurologically-Based, Mechanism-Driven, Approach to Immersive Learning Research. 2nd Place Student's Choice Award, Translational Biology, Medicine, and Health, Student Research Presentations, Roanoke, Virginia, 2017.

ABSTRACT

Neurorehabilitation is the clinical effort to repair brain injuries. Telehealth, or telemedicine, is the use of digital technologies to assist in the delivery of healthcare. Telehealth can take many forms - you can do a teleconference with your doctor, you can access your medical records online, or you can use a fitbit to promote preventative healthcare. One form is telerehabilitation, examples include video conferencing with your physical therapist, using video game based rehabilitation systems, or the use of digital cameras and programs to capture and analyze your movements. This document explores some of the ways tele-neurorehabilitation can use digital technologies to help promote neurological repair and recovery. The first chapter is a review of the literature on the use of avatars, or digital placeholders such as animated characters or virtual representations of the patient, in neurorehabilitation and how their use has the potential to promote neurological repair. The second chapter explores the use of a wearable remote control device for the promotion of enjoyability and intensity (high repetitions of desired movements) in the pediatric neurorehabilitation context. The third chapter pilot tests a video-based assessment methodology and explores the telehealth potential of such an assessment methodology and the final chapter demonstrates how this assessment methodology can be used in pediatric neurorehabilitation in a case study on the treatment of Kernicterus, a pediatric disorder that results from bilirubin toxicity. Collectively these works provide a review of the potential for telehealth approaches in neurorehabilitation and preliminary data on how these approaches might be implemented in the field of pediatric neurorehabilitation.

PUBLICATIONS

Mann, Jessie. (2020). Pilot study on the use of a video-based metric goal attainment assessment. *Developmental Neurorehabilitation*, In press.

Mann, Jessie. (2020). The medical avatar and its role in neurorehabilitation and neuroplasticity: A review. *NeuroRehabilitation*, 46(4), 467-482. https://doi.org/10.3233/NRE-203063

Mann, J., Wallace, D. A., & Deluca, S. (2020). Case Study on the use of Intensive Pediatric Neurorehabilitation in the Treatment of Kernicterus. *Journal of Clinical Movement Disorders*, 7(1), 1. https://doi.org/10.1186/s40734-020-0084-z

Mann, J., Polys, N., Diana, R., Ananth, M., Herald, B., & Platel, S. (2017). Virginia tech's study hall: A virtual method of loci mnemotechnic study using a neurologically-based, mechanism-driven, approach to immersive learning research. *2017 IEEE Virtual Reality (VR)*, 383-384. https://doi.org/10.1109/VR.2017.7892337

Mann, J. (2018) The Philosophy of Art and Technology in Pitt, J. & Shew, A. (Eds.) *Spaces of the Future: A Companion to the Philosophy of Technology*. Routledge Philosophy Companions.

PRESENTATIONS

Presentation: Mann, J., Jones, T., Ampatzi, V. Art and Neuroscience: Memory Bank. SECAC, Chattanooga, October, 2019.

Poster: Mann, J., Wallace, D., Mukherjee, K., DeLuca, S. Using Intensive Pediatric Neurorehabilitation for Children with Microcephaly Secondary to CASK Mutation. AACPDM Annual Meeting, California, 2019.

Poster: Mann,J., Wallace, D., DeLuca, S. Case Study on the use of Intensive Pediatric Neurorehabilitation in the Treatment of Kernicterus. AACPDM Annual Meeting, California, 2019.

Poster: Mann, J., Polys, N., Diana, R., Ananth, M., Herald, B., Patel, S. . Virginia Tech's Study Hall: A Virtual Method of Loci Mnemotechnic Study using a Neurologically-Based, Mechanism-Driven, Approach to Immersive Learning Research. IEEE VR, Los Angeles, March, 2017.

Poster: Mann, J., Polys, N., Diana, R., Ananth, M., Herald, B., Patel, S. . Virginia Tech's Study Hall: A Virtual Method of Loci Mnemotechnic Study using a Neurologically-Based, Mechanism-Driven, Approach to Immersive Learning Research. Virginia Tech Graduate Student Research Symposium, Blacksburg, March, 2017.