Validation of a Virtual Shopping Environment to Study Cognitive Fatigue User Experience Study

James A. Holdnack, National Institute of Nursing Research /NIH
Sara Flash, National Institute of Nursing Research /NIH
Patricia Flatley Brennan, National Library of Medicine, NINR/NIH

Background: Cognitive fatigue (CF) is a human response to stimulation and stress that commonly occurs as a comorbidity in many medical conditions, ultimately contributing to disability. Because it is difficult to study naturalistic cognitive activity under controlled conditions, we created in an immersive Virtual Reality grocery store, an environment familiar to lay people yet likely to replicate cognitive activity of interest. **Objective:** Validate the acceptability, usability, and realism of an immersive shopping environment. **Methods:** Twenty-four participants, ages 20-71, were stratified and randomized into 1 of 3 experiences (control task, cognitive challenge, emotional challenge). While in the HMD, participants completed a short training, a 30-minute shopping experience and pre- and post-shopping rating scales for a total of 50 to 60 minutes. Observational ratings, self-reported symptoms, and user experience interviews were completed for each participant. **Results:** Most participants made interface errors during the training; but errors were less frequent during the intervention. All subjects successfully selected, viewed, and purchased items and traversed the store using the interface. Eye strain and physical symptoms increased from pre- to post-VR primarily in experience 1. Participants reported avatars and freezer sections as most unrealistic and products, layout, and ambience as being realistic. **Conclusion:** Based on user feedback, we increased the length of the training and improved description of the controller interface. We added freezer doors and location changing avatars to increase realism. We modified experience 1 to include a minor task and more engaging audio to reduce boredom. Experiences 2 and 3 functioned as expected.