Demonstrating the use of technology in brain injury rehabilitation: The ManageMyFatigue App

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Abstract

As many as 73% of patients recovery from acquired brain injury complain of being tired or feeling fatigue (i.e., feeling of exhaustion, tiredness, weariness or lack of energy) up to 5 years post injury.[7] Cognitive fatigue has also been identified as one of the most debilitating symptoms in psychiatric mood disorders. It affects nearly 100% of all depressed individuals.[2] Despite the administration of pharmacological treatments, 80% of patients consistently report enduring levels of tiredness.[6] Sleeplessness and fatigue are some of the most frequent markers of migraines,[8] autoimmune and degenerative diseases, including primary Sjögren's syndrome,[10] systemic lupus erythematosus,[1] rheumatoid arthritis,[8] multiple sclerosis,[3] and PTSD.[5] In Parkinson's disease, fatigue is the primary non motor symptom in over 80% of patients in advanced stages.[4] Fatigue significantly impacts every aspect of one's life. It can impact a person's ability to successfully maintain a job, go to school, and/or perform necessary responsibilities at home.

Problem

Consequences of cognitive fatigue include decreased self-confidence and self-esteem, and a variety of other personal and family issues. Helpful hints and/or procedures for improving sleep and reducing fatigue often fail, while a practical solution to effectively deal with and manage fatigue on a day-to-day basis is still not widely available. Research[9] suggests that time-on-task is a more powerful predictor of fatigue than task difficulty; thus, helping users monitor their time-on-task and remember to take breaks is key to successfully managing fatigue. Currently, there are no known methods or devices designed to assist individuals with identifying how much time should be spent on a particular task, before energy levels become exhausted. Similarly, there are no known methods or devices designed to help individuals effectively plan around cognitively demanding activities.

Purpose

The purpose of the current study is to evaluate whether or not differing levels of brain injury survivors have the functional and cognitive ability to learn how to navigate the ManageMyFatigue (MMF) App.

Research Question & Hypothesis

- Can individuals living with an acquired brain injury learn how to use the MMF App in their daily lives?
- If individuals have an acquired brain injury, they can learn how to use the MMF App.

Methods

The current study took place over 2 days, with a 4 day break between sessions. Four students (one male and three females) were selected from the Coastline Acquired Brain Injury (ABI) Program in Newport Beach, CA. The program consists of four levels (tiers) of post-brain injury level of functioning. All students had no previous exposure to the MMF App. Once selected, students were invited for a 30 minute training session, where the purpose of the research study was explained and participant consent was obtained. Students were shown how to access 12 video tutorials on the MMF website. Students viewed the first video at the training session. They were instructed to watch the remaining 11 videos by the time the group met again, 4 days later. They were also instructed that a posttest would be administered to evaluate if they had learned to use the app. On the second day of the study, students were evaluated on 21 tasks spanning three categories: Each task was evaluated as complete (1 point) or not complete (0 point). A copy of the posttest is included on the right.

Tier 1: Mostly impaired scores in neuropsychological testing. Includes difficulties with language, attention and concentration, verbal and visual memory, processing speed, and executive functioning. Low scores on behavioral measures and community integration (i.e. home, social, vocational productivity). Require assistance with attendance and punctuality, self-awareness and self-regulation, judgment and decision making, and compensatory strategies for memory difficulties.

Tier 2: Borderline to low average neuropsychological testing, with some impaired ranges. Scores typically reflect left versus right hemispheric injury patterns (i.e. poor language with good visual skills or vice versa). Moderate behavioral and community integration scores. Slow processing speed and may feel "foggy." Require assistance with completing tasks on time (i.e. completing assignments, paying bills, scheduling appointments) and decision making.

Tier 3: Mostly low average neuropsychological scores with some average and borderline ranges. Lesser difficulties in decision making. May have difficulties finding words but can express themselves. May take longer to perform certain tasks, but are able to work through them on their own. Mild behavioral and community integration scores and are beginning vocational or educational transition.

Tier 4: Mostly low to average neuropsychological testing, with some high average to superior scores. Good behavioral awareness and self-regulation. Good compensatory strategies across all needed areas. Good community integration. Preparing to graduate with a firmly developed and approved educational and/or vocational transition plan.

ManageMyFatigue App Learning Evaluation of Differing Brain Injury Tiers
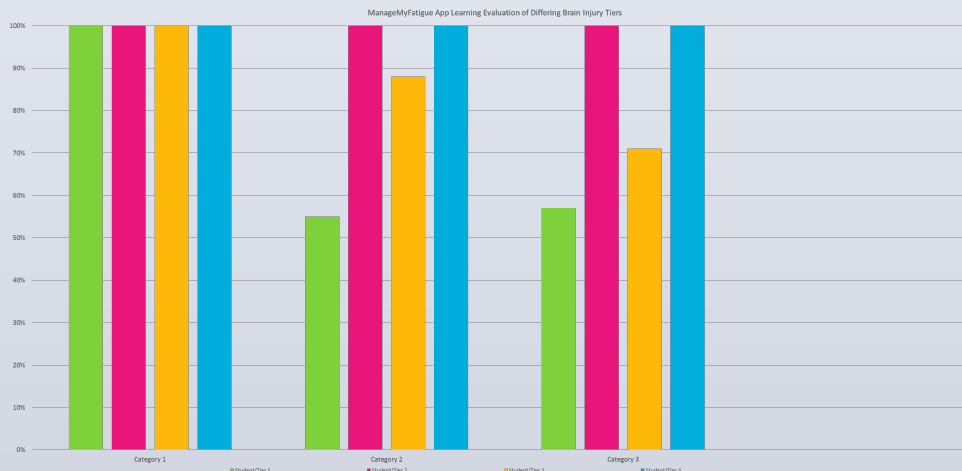
Results

Of the four students selected, the Tier 4 and the Tier 2 students completed the post-test with 100% accuracy. One student (Tier 3) was able to complete 100% of the first set of tasks, before her performance dropped to 88% and 71% on the second and third set, respectively. The Tier 1 student accurately performed 100% of the first set of tasks. His performance dropped to 55% and 57% on the second and third set, respectively.

Discussion

The results suggest that individuals with different levels of functioning after traumatic brain injury will vary in how efficiently they are able to learn how to utilize and implement the MMF App in their daily lives. The Tier 1 student expressed during the evaluation that he had only watched the first half (6/12) of the video tutorials. This would account for his perfect score on the initial categories, with a decline in performance on the second and third categories. The Tier 3 student developed a headache midway through the posttest, and stated this affected her ability to concentrate. This makes sense considering two of her mistakes occurred on nearly identical tasks. On the MyDay category she was asked to add a "reading activity task with a 2:00 pm reminder," which she successfully completed. The following task required her to add a "gardening task without a reminder," which she was unable to do so.

Limitations of the current study include a small sample size. Future research should comprise a larger selection of students. In addition, a method to ensure students participated in the video tutorial training prior to administering the posttest should be implemented. This may entail having students complete a set of tasks at home, which requires them to watch each video, and then returning this evaluation to the research investigators on the day of the posttest administration.

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*A reference sheet is available on request.