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Abstract

Research has demonstrated that as many as 73% of patients recovering from acquired brain injury complain of being tired or feeling fatigued (i.e., feeling of exhaustion, tiredness, weariness or lack of energy) for up to 5 years post injury.⁷ Fatigue is a frequent marker of migraines,⁸ PTSD, and other psychiatric/mood disorders.² It is largely present in autoimmune and degenerative diseases as well, including primary Sjögren's syndrome,¹⁰ systemic lupus erythematosus,¹ rheumatoid arthritis,⁸ and multiple sclerosis.⁹ In Parkinson's disease, fatigue is the primary non motor symptom in over 80% of patients.⁴ Time-on-task is the most powerful predictor of fatigue.² The ManageMyFatigue App helps users identify the need for breaks, monitor their time spent on a task, and rate their overall energy levels so as to efficiently approach future activities. However, learning how to use the app requires the ability to retain information provided in video tutorial training. This study seeks to expand on a previous pilot study¹¹ by demonstrating that individuals recovering from brain injury have to cognitive capacity to learn how to utilize the app and implement it in everyday life.

Problem

Research suggests that time-on-task is a more powerful predictor of fatigue than task difficulty.² Moreover, teaching individuals how to conserve energy can alleviate fatigue after brain injury.⁶ Helping users monitor their time-on-task and remember to take breaks is key to successfully managing fatigue. Cognitive fatigue has been operationally defined as a decrease in alerting, orienting, and overall executive attention.⁵ Thus, the current study raises the question: Can individuals with brain injury related fatigue successfully learn to use and implement assistive technology?

Purpose

The purpose of the current study is to build on previous research on learning how to use assistive technology by brain injury survivors.¹¹ Our goal is to demonstrate that individuals with differing levels of brain injury 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 7 days. A copy of the MMF App was provided as compensation. Twelve volunteers (three males and four females) were recruited 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. No subject had previous exposure to the MMF App. Once selected, subjects were invited for a 30 minute training session, where the purpose of the research study was explained and consent was obtained. Subjects were shown how to access 12 video tutorials on the MMF website, for a total viewing time of 46 minutes. An access card with instructions for how to do so from home was also provided. The MMF App was downloaded for each subject individually onto their personal electronic devices (tablet or smartphone). They were instructed to complete the training videos by the time the group met again, 4 days later. Subjects were also instructed that a posttest would be administered to evaluate if they had learned how to use the app, by performing routine functions on the app. When the group reconvened, 5 subjects reported they were no longer interested in participating. Two additional subjects reported having lost their access card and had forgotten how to access the training videos. The two subjects were given an additional 2 days to complete the training. A total of 7 subjects were evaluated on 21 app specific tasks. Each task was evaluated as complete (1) or not complete (0). A copy of the posttest is included to 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 transition with a firmly developed and approved educational and/or vocational plan.

ManageMyFatigue App Learning Evaluation by Level of Brain Injury Rehabilitation



TASK	SUBJECT 1	SUBJECT 2	SUBJECT 3	SUBJECT 4	SUBJECT 5	SUBJECT 6	SUBJECT 7
Scoring 0 = not completed; 1 = completed							
MMF App SETTINGS							
Wake-up Alarm (set time)							
Only Task (set)							
Break (set)							
Bedtime Reminder (set time)							
Alert (set)							
MMF App Tasks							
Create a Work Category							
Add the following two tasks: Email (30 min) and Filing (20 min)							
Get the Work Category to see Work/Volunteer							
Get the Work Category Filing Task (20 min)							
Create a School Category							
Add the following two tasks: Homework (60 min) and Reading (20 min)							
Delete the Reading Category and any of its tasks							
Add one break activity to one							
Delete one of the existing break activities							
MMF App History							
Add Work/Volunteer Email Task with a 2:00 PM reminder							
Add the School/Reading Task with a reminder							
Add one other task with a reminder							
Get School Reading Task to have a 3:00 PM reminder							
Answer the task "School Reading" 2x (ask you selected 3x)							
Work/Volunteer Email							
Start one of the tasks and stop (before the timer counts down)							
Change Email address and get it 3:00							

Results & Discussion

The current study sought to build on a previous pilot research demonstrating the functional and cognitive ability of individuals with brain injury to learn how to use the MMF App.¹¹ Our initial research found post-test evaluation rates for the following in total proficiency: Tier 1, 71%; Tier 2, 100%; Tier 3, 86%; Tier 4, 100%. Similarly, our current research found the following: Tier 1, 74%; Tier 2, 78%; Tier 3, 86%; Tier 4, 100%. Our results indicate that individuals with differing levels of brain injury demonstrate the capacity to learn to use, and implement the MMF App in recognizing and managing cognitive fatigue. Moreover, our results indicate that learning performance decreases as more complex tasks within the app are demanded. For example, setting up basic settings and routine tasks appears to be easier than planning an entire day. Interestingly, the current research elucidates the ability of some individuals to learn how to navigate the app, even in the absence of training; a finding not previously examined. Although this may simply be the result of advanced technology skills, it is worth noting the MMF App's relative ease of use. Limitations of the current study include generalizability of the results to survivors of brain injury in other settings. The current subject cohort was recruited from an acquired brain injury rehabilitation program. By this very nature, subjects in this program may have certain advantages, including moral and social support, which may positively affect self confidence in undertaking novel projects.