The Effects of Reward and Incentive on Performance on the Symbol Digit Modalities Test (SDMT) in MS
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Abstract

Purpose: Previous research has shown that external rewards enhance motivation and improve performance on tasks. A cognitive task validated for MS was conducted to determine if monetary incentives would enhance performance on the cognitive task.

Method: 20 individuals with MS were recruited from the MS Center at Holy Name Medical Center in Teaneck, NJ. Participants were administered two trials of a cognitive task, one with a reward and one without, to determine the effect of the reward paradigm on performance. A T-Test was conducted to figure out if there was a difference between the two conditions.

Results: There was no significant difference between the reward and no reward conditions on the cognitive task.

Conclusions: The cognitive task may be robust to the effects of an incentive-based paradigm. Additionally, MS participants may have impaired reward processing. Additional research is necessary to determine the mechanism of this effect.

Keywords: Multiple Sclerosis, Cognitive Functioning, Reward, Incentive, Symbol Digit Modalities Test (SDMT)

Background

Multiple Sclerosis (MS) is a neurodegenerative and inflammatory chronic disease of the central nervous system, characterized by substantial impacts on physical, cognitive, and psychological functioning [1].

Extrinsic monetary reward has been shown to be an effective way to improve task performance [2].

One study showed that reward was not able to overcome the effect of fatigue to improve task performance in participants with MS as it did in healthy controls [3].

MS patients often have difficulty learning how to predict future rewards [4].

A recent study showed that chronic pain may interfere with the areas of the brain involved with reward processing in MS [5].

Methods

Procedure: 20 participants diagnosed with MS were recruited to participate in the study from the MS Center at Holy Name Medical Center in Teaneck, NJ.

Measures: The Symbol Digit Modalities Test (SDMT) is an orally administered task where the participant is given 90 seconds to match a series of numbers with their appropriate symbols. This has been a well-validated cognitive measure in MS.

Each participant was administered the SDMT twice with approximately 3 to 5 minutes between each administration.

The two administrations of the SDMT included a monetary reward condition, wherein performance was incentivized through financial reward, and a control condition, with no reward offered for performance. Each participant was given both conditions.

Counter-balancing was employed to control for learning effects.

Statistical Analysis:

T-Test was conducted to determine if there was an effect of reward on task performance.

Results

- Mean (and standard deviation) for total scores on all SDMT trials: Mean (SD) = 53.6 (14.2).

- Mean (and standard deviation) of the total score for the control trial: (n=20) was 52.4 (13.9).

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This difference was not significant (t=-1.035, p=.314). The graph to the right is a visual representation of this result.

- This study is ongoing, so these results are preliminary due to the small sample size.

Impact of Reward on Performance

Scores

Control

Reward

T=1.035, p=.314

References