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 administered to MS participants to determine if monetary incentives would enhance performance on the cognitive task.
Method: 20 individuals with MS were recruited through 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.

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

Procedures

➢ 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.

➢Individual performance on the SDMT was compared between the reward and no reward administrations.

Statistical Analysis

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

Results

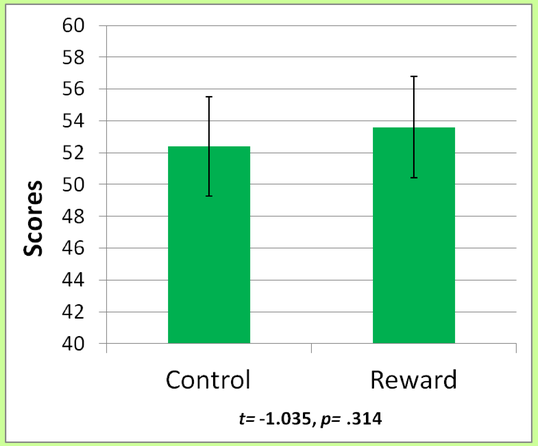
➢Mean (and standard deviation) for total scores on all SDMT trials (*N*= 40) was 53.1(14.5).

➢Mean (and standard deviation) of the total score for the control trial (*n*=20) was 52.4(13.9) and for the reward trial (*n*=20) was 53.6(14.2).

➢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



Conclusions

The reward paradigm appears to have no significant effect on performance.

➢**Potential reason 1-** The function measured by total performance on the SDMT may be relatively stable in response to reward/incentive based motivation.

➢**Potential reason 2-** MS participants may have problems with incentive-based processing.

Implications

➢It is unclear whether this result was due to the stability of the SDMT to incentive-based motivation or an issue with reward processing in MS participants.

➢A follow-up study comparing MS participants to healthy controls should be conducted to determine the underlying reason for this result.

References

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