

by intact clustering on a microscopic scale but less strong organization into distinct clusters on a larger scale.

**Categories:** Multiple

Sclerosis/ALS/Demyelinating Disorders

**Keyword 1:** multiple sclerosis

**Keyword 2:** language

**Keyword 3:** fluency

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#### 45 A systematic review of cognitive correlates of fatigue in pediatric-onset multiple sclerosis

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**Objective:** Fatigue is common in pediatric-onset multiple sclerosis (POMS), yet causal factors and correlates of fatigue are poorly understood in this population. A 2016 review suggested an association between fatigue and emotional difficulties, sleep disturbance, and reduced quality of life in POMS. Information regarding the potential association between fatigue and cognitive challenges is limited and mixed. Through this systematic review, we searched for relationships between fatigue, cognition, and mental health.

**Participants and Methods:** Systematic review methodology and PRISMA guidelines were followed. Five electronic databases were searched: Ovid: Medline, Ovid: EMBASE, Ovid: PsycInfo, Web of Science and CINAHL. Search terms were specific to each database. Reference lists of included studies were also hand-searched. We included empirical studies that were published in English after 2001, included a sample with confirmed diagnoses of POMS using McDonald criteria, and measured fatigue, cognition and clinical factors including mental health outcomes. Cognition had to be

assessed using a standardized assessment tool and studies must have examined associations between outcomes of interest either descriptively or by assessing bivariate or multivariate relationships.

Covidence was used to complete the screening, extraction, and quality assessment. Two independent researchers (i.e., T.L.F, and/or S.D, and/or M.G) reviewed each paper included in the title and abstract screen and full text review. S.D and M.G completed the extraction and quality assessments. Conflicts at all stages were resolved by the lead author (T.L.F). The University of Adelaide JBI critical appraisal checklist for analytical cross-sectional studies was used to ensure the scientific rigor of each included study.

Sample characteristics and measures of fatigue, clinical and cognitive variables were extracted. A narrative synthesis was conducted.

**Results:** We identified 1025 abstracts through our initial search and retained 119 articles for full text review. One hundred and six of these studies were excluded during the full text review including six studies which did not examine the relationship between the outcomes of interest. Fifty-one additional studies were identified from hand-searching reference lists of included studies, of which 24 were retained for full text review. A total of 15 studies were extracted and analyzed. Overall, a positive relationship was found between fatigue and mental health outcomes (i.e., anxiety and depression), whereas results were mixed regarding the association between fatigue and performance-based measures of cognition as well as fatigue and other clinical characteristics (e.g., disease duration, EDSS, treatment with DMDs, relapse rate, age at disease onset). In some studies, fatigue and executive functioning performance were negatively related; the relationship was less clear in others (e.g., both fatigued and non-fatigued MS patients demonstrated cognitive challenges, an association between fatigue and executive functioning was identified at follow-up but not baseline). Eleven of the 15 included studies (73%) did not identify associations between fatigue and cognition.

**Conclusions:** While studies are mixed, fatigue in children has been associated with aspects of cognition. Understanding the relationship between fatigue, cognition, and mental health and identifying gaps in the existing literature, have implications for informing interventions for this clinical population.

**Categories:** Multiple

Sclerosis/ALS/Demyelinating Disorders

**Keyword 1:** multiple sclerosis**Keyword 2:** cognitive functioning**Keyword 3:** fatigue**Correspondence:** Tracy Lauren FabriDepartment of Psychology, York University,  
Toronto, Canada tfabri@my.yorku.ca**46 Depression and Reward  
Responsiveness in Multiple Sclerosis**Valerie Humphreys, Fareshte Irani, Darshan Patel, Maria Schultheis, John Medaglia, Kathryn N Devlin  
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**Objective:** Depression is common in persons with MS (PwMS), substantially contributing to morbidity and mortality. Depression can dually impact PwMS as both a psychosocial reaction to living with the disease and a neurological effect of it. Cardinal features of depression include reduced ability to seek and experience pleasure, often attributed to dysregulation of the brain's reward system. People with depression exhibit atypical reward processing, as do fatigued PwMS. However, it is unclear whether MS itself affects reward processing, and whether it interacts with depression. The current study explored the associations of depression, MS, and their interaction on reward responsiveness. We hypothesized that depression and MS would independently be associated with poorer reward responsiveness and that they would interact synergistically to impair reward responsiveness.

**Participants and Methods:** Forty PwMS and 40 healthy age- and education-matched healthy controls (HC) participated in a computerized switching task with high- and low-reward manipulations. The Chicago Multiscale Depression Inventory (CMDI) Mood subscale measured depressive symptoms. The Behavioral Inhibition/Activation Scales (BIS/BAS) measured self-reported reward responsiveness and behavioral inhibition. Switching task performance was measured as response time (RT) and accuracy. Performance differences between the high- and low-reward conditions represented performance-based reward responsiveness. Linear mixed effects models were used to estimate the associations of MS and depression with reward

responsiveness, behavioral inhibition, and task performance.

**Results:** Depression, but not MS, was associated with higher BIS scores ( $p=.007$ ). Neither depression nor MS was associated with BAS subscales. On the switching task, participants who reported lower depression responded to reward such that they were slightly faster in the high-reward condition compared to the low-reward condition ( $p=.07$ ). By contrast, in participants who reported higher depression, there was no effect of reward on response time. Additionally, MS ( $p=.009$ ) and depression ( $p=.018$ ) were each associated with slower response times. Regarding accuracy, no effects of reward were observed; however, there was an interaction between MS and depression. Among HC participants, depression was not related to accuracy. In comparison, PwMS who reported higher depression were more accurate than PwMS who reported less depression ( $p=.043$ ).

**Conclusions:** Consistent with hypotheses, higher depressive symptoms were associated with increased behavioral inhibition. Depression was not associated with self-reported reward responsiveness, but it was associated with reduced reward responsiveness on a cognitive task. Contrary to hypotheses, MS was not associated with reduced reward responsiveness. Additionally, higher depression and an MS diagnosis were related to slower response time, consistent with prior findings that psychomotor slowing is a hallmark feature of both disorders. Interestingly, we observed a unique behavioral trend in PwMS, such that PwMS with higher depressive symptoms were more accurate than PwMS with lower depressive symptoms, whereas this relationship was not present among HCs. Altogether, depression in both PwMS and cognitively healthy individuals may be associated with blunted reward responsiveness, but MS does not exacerbate this relationship. In fact, PwMS with depression may be more conscientious in their functioning and therefore perform better on cognitive task accuracy. Continued work should examine how reward processing and its underlying mechanisms may differ in depressed PwMS.

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**Keyword 1:** multiple sclerosis**Keyword 2:** depression**Keyword 3:** motivation