

# Fatigue Following Spinal Cord Injury

## Fatigue Definitions and Consequences

Fatigue is generally defined as feelings of tiredness, lack of energy, low motivation, difficulty in concentrating, or an increased perception of effort disproportionate to attempted activities ([Anton et al. 2017](#); [Hammell et al. 2009](#)). It is important to distinguish between peripheral muscle fatigue, that is, fatigue that comes after exercise, and global fatigue ([Barat et al. 2006](#)). There is comprehensive research on the pathophysiology of peripheral muscle fatigue ([Ibitoye et al. 2016](#)), as well as interventions to reduce muscle tiredness associated with doing specific activities ([Hoogenes et al. 2021](#)). However, global fatigue remains an understudied issue in SCI and is often undermentioned and/or underestimated during medical interviews ([Anton et al. 2017](#); [Fawkes-Kirby et al. 2008](#); [Jensen et al. 2007](#)). Thus, global fatigue is the focus of this chapter.

For people with SCI, living with fatigue can be overwhelming, causing a profound negative impact ([Wijesuriya et al. 2012](#)). In people with SCI, fatigue has been negatively associated with social integration and productive activity ([Wijesuriya et al. 2012](#)), social participation ([Kuzu et al. 2022](#)), quality of life ([Christofi et al. 2023](#); [Craig et al. 2008](#)), psychological functioning ([van Diemen et al. 2016](#)), participation in life activities, mobility, and wheelchair use ([Smith et al. 2016](#); [Saunders et al. 2013](#); [McColl et al. 2003](#)). Moreover, fatigue may contribute to functional decline and loss of independence in people with SCI living in the community and in those aging with SCI ([Alschuler et al. 2013](#); [Moher et al. 2009](#)).

## Fatigue Measurement

Assessment of fatigue varies greatly given its multidimensional nature ([Onate-Figuérez et al. 2023](#)). Measurement of fatigue could be performed via objective methods, such as performing a task repeatedly and measuring the decline in responses, or via subjective measures, like self-reports where a participant describes or rates their fatigue ([Onate-Figuérez et al. 2023](#)).

All the studies included in the present chapter have assessed fatigue through different self-reporting methods. The most common fatigue self-report used was the Fatigue Severity Scale, an outcome measure validated in people with SCI and recently for use in people with stroke ([Anton et al. 2008](#); [English et al. 2023](#)). These self-reports are useful to evaluate perceived fatigue intensity or person's view on how much fatigue affects their lives ([Onate-Figuérez et al. 2023](#)).

## Fatigue Management

Despite fatigue affecting more than a half of people living with SCI ([Fawkes-Kirby et al. 2008](#)), we found only seven RCTs and ten lower-level studies addressing fatigue in this population.

According to the current body of evidence for treating fatigue in people with SCI, exercise-based interventions have stronger quality (and quantity) of evidence. However, there is no consensus on the type or dosage of exercise that will be more effective in reducing fatigue in people with SCI.

Other interventions tested (e.g., medications, massage therapy, self-management, promoting an active lifestyle, and the use of a Segway or exoskeleton) seem not to produce significant effects on fatigue in people with SCI. However, we did find one pre-post study that found significantly large effects on fatigue when pairing manual wheelchair users/people with SCI with a service dog for 9 months.

It should be noted fatigue was not the primary outcome measure for the majority of included studies. Most intervention research we found was attempting to improve pain, spasticity, or physical activity levels in people with SCI and fatigue was a secondary measure. Though many of these studies found positive effects in their primary outcomes that are noted here, our discussions in this chapter will be focused on fatigue.

## Ideal Fatigue Treatment for People With SCI

Due to the limited literature on fatigue interventions and the multifactorial nature of global fatigue, it is difficult to recommend one ideal treatment protocol in people with SCI. However, some previous research has highlighted certain things that would be useful to address:

- Having a better understanding of which factors are most strongly associated with fatigue is key to designing the best treatments. In a meta-analysis, [Onate-Figuérez et al. \(2023\)](#) found direct associations between fatigue and nine factors (sorted by largest to smallest effect size): self-efficacy, anxiety, stress, depression, pain, participation, analgesic medication, assistive devices, physical activity, lesion level, incomplete SCI, and medication.
- It has been suggested that the management of fatigue in people with neurological disorders like SCI and multiple sclerosis requires a multidisciplinary team and approach ([Smith et al. 2016](#); [Hourihan 2015](#)). Health professionals may treat different aspects of fatigue as follows:
  - A psychiatrist or family doctor can conduct a thorough physical exam and medical history to determine potential causes of fatigue (e.g., pain, lack of sleep, or medications).
  - Physical therapists and other fitness professionals may work with people with SCI to prescribe exercise, though they should be aware of the person's fatigue status and adjust exercise levels accordingly with gradual increases ([Rosenthal et al. 2008](#); [Hourihan 2015](#); [Heine et al. 2015](#)).
  - Psychologists, counsellors, or other mental health therapists can address the stress, anxiety, and depression that has been linked to chronic fatigue. Previous research has suggested that an evidence-based mental health approaches, such as cognitive-behavioral therapy, or the prescription of selective serotonin reuptake inhibitors, such as fluoxetine, paroxetine, or sertraline, could be considered as part of any fatigue treatment in appropriate patients ([Craig et al. 2013](#); [Rosenthal et al. 2008](#); [Onate-Figuérez et al. 2023](#)). Researchers have also suggested that cognitive-behavioral therapy could be useful in helping to reduce the effects of

chronic pain on depressive moods, and establishing more attributions of self-efficacy to increase feelings of control over one's body and health ([Craig et al. 2012](#); [Craig et al. 2013](#)).

## Gaps in the Literature

- Limited number of studies with fatigue as a primary or secondary outcome - perhaps due to its multifactorial nature, or other secondary conditions being perceived as more important, the number of studies focusing on fatigue is extremely low.
- Relationship between sleep factors and fatigue in SCI - none of the included RCTs asked about sleep quality or the presence of sleep disorders in participants.
- Relationship between medications and fatigue in SCI - none of the RCTs included established at baseline what medications participants were taking, despite the fact that multiple medications prescribed for people with SCI may cause fatigue ([Lee et al. \(2010\)](#)).