



# Mental Health and Spinal Cord Injury: Clinical Considerations for Rehabilitation Providers

Katlin R. Schultz<sup>1</sup> · Linda R. Mona<sup>1</sup> · Rebecca P. Cameron<sup>2</sup>

Accepted: 5 April 2022 / Published online: 28 April 2022

This is a U.S. government work and not under copyright protection in the U.S.; foreign copyright protection may apply 2022

## Abstract

**Purpose of Review** Assessing and addressing the mental and behavioral health concerns of individuals with SCI during rehabilitation is crucial, as untreated mental health distress can lead to reduced gains in rehabilitation and poor overall health. This review provides an overview of the latest research on prevalence rates of common mental and behavioral health concerns in the SCI population, highlighting disability-specific factors that may impact traditional assessment and treatment of mental health concerns.

**Recent Findings** While those with SCI are at a heightened risk for experiencing mental health distress, overall, the majority of those with SCI adapt well, and live a full and meaningful life.

**Summary** Rehabilitation psychologists are a vital aspect of rehabilitation teams, as they can address behavioral health and mental health concerns that may impede patients achieving their rehabilitation goals.

**Keywords** Psychological adaptation · Rehabilitation psychologists · Spinal cord injury · Mental health

## Introduction

Spinal cord injury (SCI) represents a significant life event for an individual, encompassing physiological, psychological, and social changes. The emotional, cognitive, and social sequelae following an SCI are highly individualized, fluctuate across time and setting (i.e., first year vs. 10-year post-injury, initial rehabilitation vs. post-discharge), and are influenced by cultural and contextual factors. Whereas many psychological reactions to acquiring an SCI represent normal adaptation and processing a major life change, untreated distress can have negative impacts on rehabilitation outcomes and overall quality of life (QOL). Because distress can result in reduced functional gains during initial rehabilitation treatment, increased follow-up care and medical comorbidities, and reduced health and functioning,

assessment for mental health issues is warranted [1]. Rehabilitation healthcare professionals should be aware of common mental health concerns and symptoms associated with SCI and how to work with rehabilitation psychologists to optimize rehabilitation gains and increase overall QOL for those with SCI. These issues, as well as efforts to increase awareness of disability biases within rehabilitation settings, will be explored.

## SCI and Mental Health

There are multiple levels at which rehabilitation psychologists monitor and attend to emotional and behavioral health concerns for people with SCI. This includes supporting normative adaptation that involves processing emotions and developing new behavioral strategies, as well as assessing and treating mental health conditions that may arise and impede rehabilitation. Addressing health behaviors and areas of health-related functioning with sensitivity to individual value systems and cultural contexts is important to optimize rehabilitation and overall QOL.

---

This article is part of the Topical Collection on *Spinal Cord Injury Rehabilitation*

---

✉ Linda R. Mona  
linda.mona@va.gov

<sup>1</sup> VA Long Beach Healthcare System, SCI/D Service (07/128)  
5901 E 7th Street, Long Beach, CA 90822, USA

<sup>2</sup> California State University, Sacramento, CA, USA

## Psychological Adaptation

Living with SCI requires an individual to make changes in their life to account for new physical, psychological, social, and environmental realities. Adaptation is a natural process following an SCI and can encompass internal elements such as grief/loss, feelings of uncertainty, changes in thinking processes, and alterations in identity/self-concept and sense of self-efficacy, as well as external elements, such as learning to navigate one's environment and social spaces with a disability, and addressing structural and systematic barriers and exclusion [2–4]. While many significant lifestyle changes occur within the first few years following an SCI [2], adaptation extends over the lifespan and is culture-, situation-, and context-dependent.

Resilience and positive adaptation are common among people with SCI, with studies indicating that around 60% of people adapt well after injury and report a meaningful and fulfilling life [5–7]. Factors that facilitate resilience and positive adaptation include optimism, positive self-esteem, strong support systems, problem-solving skills, positive thinking, dispositional hope, perseverance, determination, self-efficacy, sense of purpose, and spirituality [6, 8–10].

Grief following an SCI does not preclude positive adaptation; grief and resilience can (and often do) coexist, especially during the initial periods of rehabilitation [11]. After sustaining an SCI, individuals may experience a variety of emotions related to losses and changes in their life. Hope, even if considered unrealistic or a denial of one's reality by healthcare professionals (e.g., of walking again or being cured), promotes resilience, coping, and psychological adaptation, especially in the early periods following an SCI [2, 11]. While acute rehabilitation is helpful in providing solutions, adaptive equipment, and other resources to minimize functional loss, it is important for healthcare providers to allow individuals to process any sense of loss they may have and help facilitate their growth towards a good QOL post-injury. In practice, this can entail providers recognizing and validating the beliefs and values of their patient and providing appropriate education and recommendations. For example, a provider may state, "I can see your sense of hope and faith in modern medicine and technology and that one day you might be able to walk again. Based on what we currently know, engaging in these treatment modalities will likely be helpful in reaching your short-term goals of increasing strength and optimizing your current abilities. Regarding your future goals of walking and being more physically active, it is unclear if this will occur, but keeping your mind and body strong will be helpful if, and when, we have more advanced treatments."

## Depression, Anxiety, and PTSD

The potentially traumatic or distressing nature of acquiring an SCI and the associated life changes that ensue following an injury can increase the risk of mental health concerns. Not surprisingly, some individuals with SCI do experience psychological distress, including clinical levels of depression and anxiety. Prevalence rates of clinical depression among those with SCI are estimated at 22–28%; rates of clinical anxiety are around 20%; and rates of posttraumatic stress disorder (PTSD) are around 12%; whereas among the general adult population in the USA, rates for clinical depression, anxiety, and PTSD are approximately 7%, 3%, and 3.5%, respectively [12, 13•]. Common screening measures utilized for depression include the Patient Health Questionnaire-9 item (PHQ-9) and Beck Depression Inventory Second Edition (BDI-2); for anxiety, Generalized Anxiety Disorder-7 item (GAD-7), and Beck Anxiety Inventory (BAI); and for PTSD, the Posttraumatic Stress Disorder Checklist. It should be noted that the administration of these screening measures may need to be adapted and modified for people with SCI (e.g., provider may need to read items and record answers if patient has poor hand dexterity). As with any screening measure, additional follow-up from a mental health provider is important to further assess for any mental health concerns or duress that may be present for the individual.

Although risk of a mental health condition may be higher among individuals with SCI [14, 15], providers should be mindful that the majority of those with SCI adapt well after injury and do not experience clinical levels of distress. As noted above, correlates of psychological adaptation include hope; confidence that one's life and situation are manageable; use of problem-solving strategies; being goal-oriented; and strong support from family, friends, and the rehabilitation healthcare team [16, 17].

It is important for providers to assess and monitor mood and psychological distress following injury, as untreated mental health conditions can impact pain levels, self-management, goal achievement during rehabilitation, length of hospitalization, and overall health and life satisfaction [18]. Rehabilitation psychologists who are embedded in rehabilitation teams are able to provide patients with support, assist with emotional and cognitive adaptation, encourage motivation and participation in therapies, and promote strengths and positive coping skills during acute rehabilitation, which can lead to improved emotional and physical health. Collaboration among psychology and psychiatry can aid in patient care, as research supports that the combination of psychotherapy and medications increases outcomes for mood management. And for some, personal preference and/or barriers to engagement in psychotherapy may result in a

patient preferring medication over therapy [19]. Rehabilitation teams that have psychiatry and psychology services available would likely benefit from collaborating on patient treatment plans and having both services offered to patients who present with mental health concerns.

### **Suicide and Self-harm**

There is an increased risk of suicide among people with SCI compared to the general population, attributable to both pre- and post-SCI factors (e.g., psychiatric history prior to SCI, increased duress following SCI, and associated changes in functioning), with estimates of 4–11% of deaths following SCI attributable to suicide [20, 21]. Routine and ongoing suicide assessment is standard best practice and can occur with self-report measures (such as specific items on the PHQ-9 and BDI-2) as well as direct questions during medical visits. When engaging in self-harm and suicide assessment, it is critical for providers to be mindful of any biases they made hold related to the intersection of disability and suicidality, as these biases can impact appropriate assessment, diagnosis, and treatment [22]. Examples of disability bias include the ineffectual bias (e.g., patient is unable to engage in suicidal behavior, and therefore treatment options are minimized) and the catastrophe bias (e.g., overestimation/assumption of mental health concerns than present for a patient, leading to misdiagnosis and aggressive treatments) [22]. Finally, it is important for healthcare providers to be cognizant of resources and facilities that can meet the needs of patients with SCI and suicidality, as many psychiatric units/hospitals are not equipped to meet the needs of patients with SCI (i.e., appropriate beds and equipment, staff, medical care). Working with rehabilitation psychologists and other team members can be especially important to provide patients with appropriate services, maintaining safety, and supporting patient's mental health.

### **Cognitive Impairment**

Depending on the nature of one's SCI, head trauma and associated cognitive impairment may impact rehabilitation treatment and QOL. Rates of comorbid cognitive impairment are elevated in the SCI population; prevalence ranges from 10 to 60% [13, 23, 24]. Common causes of cognitive impairment among the SCI population include traumatic brain injury, anoxia, cerebral vascular accident, dementia, polypharmacy, and cognitive impairment secondary to psychological distress [23, 24]. Furthermore, research indicates that SCI is a risk factor for dementia, likely due to neurodegeneration following an SCI and other comorbid risk factors [23].

Due to the nature and extent of rehabilitation which often demands a great deal of energy and cognitive capacity, including learning, memory, and communication skills

[24], it is necessary to screen patients for cognitive deficits that could impact rehabilitation, and provide tailored recommendations for the patient and the team to maximize treatment progress during acute rehab and long-term care. Screening measures such as the Montreal Cognitive Assessment (MoCA) or Mental Status Examination (MSE) can be helpful tools for providers to screen for potential cognitive deficits/impairments, although adapting administration is likely needed to account for disability-related factors. Informal assessment/screening is also an invaluable tool, as input from other providers and the patient's support system can identify changes or deficits related to cognition during and post-initial rehabilitation. Rehabilitation psychologists are equipped to provide initial screening and assessment related to cognitive concerns, and can refer to neuropsychology as appropriate. Appropriate assessment of cognitive concerns entails specialized attention to the methods, measures, and normative references used when conducting neuropsychological assessment within the SCI population. Modifications to standard testing protocols and interpretation of results may be necessary to best capture cognitive functioning for patients whose physical disabilities could preclude standardized administration of assessment measures.

### **Sexuality, Intimacy, and Relationships**

SCI can impact sexuality, pleasure, and intimate relationships in a multitude of ways due to primary, secondary, and tertiary effects of one's injury. People with SCI, as well as their current or future partners, often navigate new dynamics within their relationships, including roles, care needs, social connection, and emotional and sexual intimacy [25]. Couples often experience increased duress after one partner experiences an SCI, with research among heterosexual couples indicating that those who respond to SCI with flexibility, openness, and creativity tend to fare better than those who engage in denial or minimization in response to changes in relationship dynamics [25]. Although less is known about sexual minority couples in which one or both partners have an SCI, recent research on sexual minority couples with disabilities suggests that cultural humility—a commitment to exploring and understanding cultural biases and their implications—facilitates understanding disability identity and lived experiences and can increase intimacy and support [26]. An area in which many partners report difficulty is the challenge of navigating between the roles of caregiver and spouse/partner [25]. While hiring an outside caregiver can be helpful, this is not always feasible for financial, cultural, and other reasons. Exploring the changes within partnership dynamics following SCI, as well as available resources in one's community and support system, can be an integral part of rehabilitation and successful transition to the community post-rehabilitation.

Research on primary effects of SCI on sexual functioning predominantly focuses on issues related to male, heterosexual normativity, including erectile dysfunction, penile sensation, and hypogonadism [27, 28]. Women's physiological effects include reduced ability to experience orgasm, although fertility and reproduction are often unaffected. Beyond the physiological effects of SCI on sexual functioning, secondary (e.g., pain, bowel/bladder management) and tertiary (e.g., changes in body-image, self-identity, relationships) effects post-injury are often reported to be more disruptive to sexuality and sexual expression [27]. Psychological factors, such as changes in sexual self-esteem (i.e., feelings of worth as a sexual partner and sense of self as a sexual being) and anxiety about physical and emotional intimacy post-injury, also affect sexual wellness.

Sexual health and sexual rehabilitation are typically addressed minimally or not at all during acute rehabilitation [27], as other rehabilitation needs are prioritized during early stages of adaptation to SCI. However, addressing sexual health and intimacy early on and during follow-up care is critical, as sexuality is an important aspect of health and well-being for many people. Rehabilitation settings are optimal for addressing such concerns, where interdisciplinary approaches to sexual health education and interventions can result in more robust outcomes. Rehabilitation psychologists are educated and trained to (1) assess sexual health needs, (2) identify and address psychological factors impacting sexual health and expression, and (3) co-treat with other disciplines to address factors impacting sexual expression, such as working with occupational and physical therapists on optimal positioning and consulting with physicians about options for medications and devices to assist with sexual performance [27, 29].

### **Intimate Partner Violence and SCI/Disability**

Intimate partner violence (IPV) among people with disabilities (PWD) can present differently than it does among non-disabled individuals [30]. For instance, some PWD require caregiving assistance for medication management, activities of daily living, and mobility, which can create barriers for PWD to report IPV or leave an abusive partner or caregiving situation. Healthcare providers should take special care to appropriately assess and address IPV and be mindful of the nuances that may present at the intersection of SCI and IPV.

### **Behavioral Health Factors Associated with SCI Rehabilitation**

Patient motivation for engagement in rehabilitation has been identified as a crucial factor in adapting to disability and managing related medical concerns [31]. Many behavioral

health factors, such as pain, dysregulated sleep, substance use, exercise, and nutrition, can negatively affect engagement and motivation in rehabilitation therapies, which can ultimately increase risk for psychological distress and reduced QOL following SCI [32]. Rehabilitation teams can work together to increase motivation and facilitate increased participation in, and adherence to, treatment to reduce re-hospitalization and other negative outcomes [31]. Providers are encouraged to facilitate motivation and engagement by focusing on patient strengths in addition to acquired deficits, assisting patients in gaining self-confidence to reach treatment goals, and involving patients in all aspects of treatment decisions [31]. Centering rehabilitation goals around the values and goals of the patient, and not those of the provider, is important to facilitate motivation. Furthermore, by adequately addressing common comorbid behavioral health factors, including chronic pain, sleep dysregulation, substance use, and nutrition and exercise, healthcare providers can reduce common barriers to engagement in rehabilitation, thus maximizing patient outcomes.

### **Chronic Pain**

Chronic pain is common among people with SCI, with prevalence rates of 65–85% [6, 33, 34]. Chronic pain can interfere with engagement in medical care, therapies, and leisure activities [33, 35]. Furthermore, unmanaged chronic pain has been associated with psychological distress, which can further exacerbate pain perceptions and reduce physical comfort and QOL [36]. Similar to pain in other populations, chronic pain among the SCI population is difficult to manage due to the multifactorial nature of the pain experience [37]. Traditional medical approaches to pain management (e.g., medications, injections, surgeries) are not highly effective for long-term chronic pain management among the SCI population when used in isolation [33]. Furthermore, PWD often have difficulty accessing appropriate medications to effectively manage pain due to concerns related to long-term opioid use, discrimination against those who use opioids for pain management, and restrictions on pain medications for those prescribed certain psychiatric medications, as well as inaccessible treatments for PWD [38]. Alternative treatments (e.g., physical therapy, massages, residential rehab programs) are not always accessible for PWD, due to physical demands of attending appointments, lack of transportation, and high costs of these treatments.

Understanding chronic pain from a psychological perspective has led to improved outcomes for pain management [39]. Interventions focused on psychoeducation, as well as acceptance and mindfulness-based approaches for pain management, have been shown to improve mood and engagement, reduce pain intensity and severity, and reduce use of pain medication among those with SCI [33]. A

multidisciplinary approach that addresses pain from both a pharmaceutical and psychological approach has been shown to be most effective for long-term coping and management of pain and aligns well with a patient-centered approach to pain management [37].

### Sleep Dysregulation

Common sleep disorders within the SCI population include disordered breathing, sleep-related movement disorders, circadian rhythm sleep wake disorders, and insomnia [40]. Physiological and anatomical factors contribute to an increased risk for sleep disorders among those with SCI, and other factors that can impact sleep include frequent bed turns/pressure relief, self-catheterization schedules, and unmanaged pain. Poor sleep can have negative effects on an individual's functioning, including daytime fatigue, difficulty concentrating, and reduced engagement in meaningful activities [40]. Psychological interventions focused on sleep hygiene, such as cognitive behavioral therapy for insomnia (CBT-I), are shown to be more effective in improving sleep than medications alone, with adaptations to traditional sleep hygiene methods to account for disability factors showing promising outcomes [41].

### Substance Use

A history of substance use and misuse is associated with increased risk for SCI onset, as well as reduced gains in rehabilitation treatment and more difficulties reintegrating into one's community post-discharge [42]. Similarly, post-injury onset of substance misuse has also been correlated with reduced gains during rehabilitation, reduced life satisfaction, and increased risk for depression and medical complications. Pre-injury substance misuse is acknowledged by approximately 35–49% of the SCI population, and nearly 25% of those with SCI in the community report current alcohol, prescription, or illicit substance abuse [13•]. As substance abuse can decrease mood and life satisfaction, and is linked to increased medical complications (e.g., pressure sores, respiratory infections, and urinary tract infections), it is essential that healthcare professionals engage in appropriate screening for substance misuse during rehabilitation. While screening measures and procedures will vary across organizations, it is imperative that providers recognize any biases that may impact appropriate screening and assessment for substance misuse (e.g., “of course you would be using alcohol more with all the changes you have been going through”; “You must be drug-seeking since you keep insisting on additional pain medications”). With routine, unbiased assessment, psychologists and other professionals will be better equipped to provide support and treatment options for those with comorbid substance abuse, in order to maximize

gains in rehabilitation, and improve QOL and life satisfaction [13•].

Despite higher rates of substance misuse among those with acquired disabilities as compared to the general population, substance abuse treatments are underutilized by PWD [43]. Notably, many treatment centers are not physically accessible to PWD, limiting participation and engagement in these needed services. For people with SCI, accessible treatment programs would require environmental accessibility (e.g., appropriate mattresses/beds, lifts, accessible bathrooms), appropriately trained staff to adhere to the specific caregiving needs of the patient, and accommodations to typical programming to account for the specific physical health needs of the patient (e.g., therapies, inclusive activities and treatment assignments). These barriers to treatment likely contribute to the low rates of substance abuse treatment involvement, with negative consequences for the health and well-being of people with SCI and other mobility impairments [43].

### Nutrition and Exercise

Changes in physical activity and dietary needs are common among the SCI population, as nutritional needs change as a function of general reductions in energy expenditure, need to maintain skin integrity, requirements of bowel/bladder management, and risk for cardiovascular disease and other associated health conditions [44, 45]. While psychoeducation and psychological interventions related to dietary changes can be effective during rehabilitation and post-discharge [46], adherence to nutrition recommendations is not always sustained [45]. It is essential for providers to consider external factors that impact nutritional decisions for people with SCI. Disability-specific factors may preclude an individual from being able to consistently adhere to recommended dietary guidelines, including difficulty swallowing, low appetite due to pain and/or medications, mobility impairments that restrict shopping and meal preparation, and financial barriers due to restrictions on healthcare insurance, high unemployment rates, and high associated costs of disability among PWD [47]. Similarly, exercise regimens may also be impacted by disability-specific factors, as physical changes in body functioning and the phenomenology of body awareness may be complex, as individuals with SCI may identify a “fragmented,” “blurred,” and/or “uncontrollable” body, which can reduce engagement in physical activity, exercise, and range of motion [48].

Healthcare providers are encouraged to be aware and mindful of factors that may contribute to dietary choices and exercise. It is important to provide an array of options for patients to address healthy eating and exercise [13•], and to work creatively with each patient to develop an attainable



and sustainable nutrition and activity plan to support overall health and well-being.

## Role of Rehabilitation Psychologists

Rehabilitation psychologists are trained to work with patients with disability and chronic health conditions, such as SCI, to assess and treat mental health conditions through a biopsychosocial lens that considers personal, relational, and systemic factors that influence disabled persons' lived experiences [49, 50, 51]. In this way, rehabilitation psychologists place less emphasis on a person's symptoms (or deficits), and instead, highlight individual strengths, and assist in identifying and ameliorating social and environmental barriers, at both the individual and systemic levels [50].

Rehabilitation psychologists predominantly operate within rehabilitation teams, leveraging interdisciplinary collaboration to address all aspects of healthcare [50]. These specialists are trained to work not only with the individual, but also engage with family members, caregivers, and other sources of support to provide comprehensive care. The scope of rehabilitation psychologists' practice is often large and multifocal, encompassing initial psychological and cognitive assessment, psychotherapy and behavioral interventions, psychoeducation to both the patient and important others (e.g., family, caregivers), and ongoing communication with rehabilitation team members. Rehabilitation psychologists often provide recommendations to patients and simultaneously to teams, such as strategies to maximize engagement in therapy sessions, improve information carry-over, and enhance communication among patients and their supports, to help optimize rehabilitation outcomes.

## Psychological Assessment and Interventions

Rehabilitation psychologists are trained in the assessment and diagnosis of psychological and cognitive disorders, including understanding normative reactions and adaptation to SCI across the lifespan [50, 51]. Rehabilitation psychologists utilize a variety of evidence-based approaches, such as cognitive behavioral therapy (CBT) [52, 53], acceptance and commitment therapy (ACT) [54, 55], and motivational interviewing (MI) [31], to treat the various mental health symptoms and conditions that arise for people with SCI and provide psychological services from a disability-affirmative stance [56].

The type of psychological treatment offered post-injury is influenced by many factors, including time since SCI onset. Psychological interventions during initial rehabilitation are often centered around managing stressors related to the rehabilitation experience and promoting engagement and

motivation in therapies. Engendering and sustaining hope, especially during initial acute rehabilitation, can be helpful in promoting motivation and problem-solving strategies to persevere through often-difficult experiences (e.g., pain, therapies, treatments, communication with team members) [2, 6]. Optimizing hope, or the belief that one is equipped to handle life stressors and to work toward life goals, entails selecting goals that are moderately challenging, rewarding, and aligned with one's values, all of which are especially relevant with newly acquired SCI. Post-initial rehabilitation and psychological interventions usually shift in focus, addressing the transition from rehabilitation to community, navigating new environments and experiences, exploring potential changes in identity, and engaging in a full and meaningful life.

In addition to rehabilitation therapies and psychological interventions, peer mentorship can be beneficial in promoting adaptive skills, health, and QOL following an SCI [2, 57]. People with SCI often identify peer mentors as helpful in their process of gaining practical skills in navigating new environmental and social experiences and connecting to a shared disability experience [57]. Peer support can be a positive addition to rehabilitation treatment, as it can offer individuals a source of community, acceptance, and hope following their injury.

Unfortunately, access to psychologists and peer support following initial rehabilitation is often limited due to multiple barriers, including limited numbers of rehabilitation psychologists in some geographical areas, limited access to disability communities and peers, non-accessible transportation, and costs of accessible transportation and medical services [52]. Research indicates that many people with SCI face new challenges after discharge [2], and express interest in post-discharge follow-up from mental health providers to assist with coping and adaptation [52]. However, fewer than half of individuals with SCI are engaged in appropriate services to address their mental health needs, both during and after initial rehabilitation [18]. Telepsychology and other internet-delivered psychotherapies have been well received within the SCI population and can mitigate some of the challenges in access to mental healthcare, specifically transportation, cost, and access to a rehabilitation psychologist [18]. The rise in telemedicine practices across disciplines, including telerehabilitation, due to the COVID-19 pandemic has helped PWD access needed healthcare services, while mitigating many barriers to appropriate care [58].

## Interdisciplinary Teams

Rehabilitation teams typically incorporate providers from multiple disciplines offering a variety of services to maximize rehabilitation outcomes. There are numerous models for team-based rehabilitation care, with interdisciplinary

teams consistently showing improved patient outcomes over multidisciplinary teams [59]. Within interdisciplinary teams, team members meet regularly to discuss the needs and goals of the patient and work collaboratively to assist the patient in reaching their identified treatment goals. Co-treatment among disciplines, including rehabilitation psychologists, is an effective way to provide person-centered care and attend to the needs and values of the patient. For instance, an interdisciplinary approach to address chronic pain for an individual with a T-4 SCI could entail the physician providing non-opioid medications, occupational and physical therapists working on equipment, physical activities, and movements to assist with pain management, and a rehabilitation psychologist utilizing behavioral interventions (stress reduction, mindful breathing, activity pacing, etc.). The rehabilitation psychologist would also provide recommendations to the team on how to best implement stress reduction strategies and pacing techniques into therapy sessions to optimize pain management. Team members would work together, meeting regularly, to meet the patient's goal of increased pain management.

Despite the many benefits of interdisciplinary rehabilitation teams, rehabilitation providers are not immune from the risk of perpetuating stereotypes about PWD. Bias from healthcare providers about disability has been associated with improper diagnoses, under-referrals, and other medical decisions that negatively impact the health and well-being of PWD [60•]. Specifically, rehabilitation programs and interventions are often framed in a way that privileges functioning and goals that are characteristic of people without disabilities; not all changes that occur after the onset of a disability (such as SCI) can or should be eradicated through rehabilitation [61]. Rehabilitation providers are therefore encouraged to assess, reflect, and challenge any beliefs or biases they may have regarding their disabled patients and the quality and meaning of their lives. When rehabilitation providers are able to collectively challenge implicit biases related to functionality, interdisciplinary teams are better able to attend to patients' individual needs, goals, and values, and assist patients in achieving their goals through the use of interventions and adaptive equipment and technologies, while acknowledging the real structural, environmental, and interpersonal barriers that are present in predominantly able-bodied societies.

## Conclusion

Rehabilitation psychologists play an integral role on rehabilitation teams, providing support to patients with SCI, as well as to the team, family members, caregivers, and significant others. As there can be a multitude of changes and challenges following an SCI and throughout initial rehabilitation,

psychologists embedded in rehabilitation teams are able to assist patients in normative adaptation to a new injury, assess and treat mental health symptoms, and address factors that could negatively impact rehabilitation gains if left untreated (e.g., pain, poor sleep, low motivation, cognitive deficits). Rehabilitation psychologists embedded in interdisciplinary teams offer additional expertise that promotes improved health outcomes for patients with SCI. Being mindful of the typical, practical, and sociocultural barriers PWD face in accessing needed treatments, rehabilitation providers are better equipped to support creative problem-solving, advocating for change, and adapting treatment strategies and goals to match the needs, values, and circumstances of their patients.

## Declarations

**Conflict of Interest** The authors declare no competing interests.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

## References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
- Of major importance

1. Richards J, Kewman D, Richardson E, Kennedy P. Spinal cord injury. In: Frank RG, Rosenthal M, Caplan B, editors. *Handbook of Rehabilitation Psychology*. 2nd ed. Washington: American Psychological Association; 2019. p. 9–28.
2. Barclay L, Lentini P, Bourke-Taylor H, McDonald R. The experiences of social and community participation of people with non-traumatic spinal cord injury. *Aust Occup Ther J*. 2019;66(1):61–7. <https://doi.org/10.1111/1440-1630.12522>.
3. Bonanno GA. Loss, trauma, and human resilience: have we underestimated the human capacity to thrive after extremely aversive events? *Am Psychol*. 2004;59(1):20–8. <https://doi.org/10.1037/0003-066X.59.1.20>.
4. Kalpakjian C, Tulskey D, Kisala P, Bombardier C. Measuring grief and loss after spinal cord injury: development, validation and psychometric characteristics of the SCI-QOL Grief and Loss item bank and short form. *J Spinal Cord Med*. 2015;38(3):347–55. <https://doi.org/10.1179/2045772315Y.0000000015>.
5. Bonanno GA, Kennedy P, Galatzer-Levy I, Lude P, Elfstrom M. Trajectories of resilience, depression, and anxiety following spinal cord injury. *Rehabil Psychol*. 2012;57(3):236–47. <https://doi.org/10.1037/a0029256>.
6. Brazeau H, Davis CG. Hope and psychological health and well-being following spinal cord injury. *J Rehabil Psychol*. 2018;63(2):258–66. <https://doi.org/10.1037/rep0000209>.
7. deRoon-Cassini T, Mancini A, Rusch M, Bonanno G. Psychopathology and resilience following traumatic injury: a latent growth

- mixture model analysis. *J Rehabil Psychol.* 2010;55(1):1–11. <https://doi.org/10.1037/a0018601>.
8. Aparicio MG, Carrard V, Morselli D, Post MW, Peter C. Profiles of psychological adaptation outcomes at discharge from spinal cord injury inpatient rehabilitation. *Arch Phys Med Rehabil.* 2019;101(3):401–11. <https://doi.org/10.1016/j.apmr.2019.08.481>.
  9. Driver S, Warren A, Reynolds M, Agtarap S, Hamilton R, Trost Z, Monden K. Identifying predictors of resilience at inpatient and 3-month post-spinal cord injury. *J Spinal Cord Med.* 2016;39(1):77–84. <https://doi.org/10.1179/2045772314Y.0000000270>.
  10. Jones K, Dorsett P, Simpson G, Briggs L. Moving forward on the journey: spirituality and family resilience after spinal cord injury. *Rehabil Psychol.* 2018;63(4):521–31. <https://doi.org/10.1037/rep0000229>.
  11. Clifton S. Grieving my broken body: an autoethnographic account of a spinal cord injury as an experience of grief. *Disabil Rehabil.* 2014;36(21):1823–9. <https://doi.org/10.3109/09638288.2013.872202>.
  12. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Washington: American Psychological Association; 2013. <https://doi.org/10.1176/appi.books.9780890425596>.
  13. Tackett MJ, Ullrich P. Spinal cord injuries. In: Brenner L, Reid-Arndt SA, Elliott T, Frank RG, Caplan B, editors. *Handbook of Rehabilitation Psychology*, 3rd ed. Washington: American Psychological Association; 2019. p. 279–302. <https://doi.org/10.1037/0000129-018>. **This chapter provides a comprehensive overview of the role of rehabilitation psychologists working with people with an SCI, including prevalence rates of mental health conditions, common behavioral health concerns, and evidence-based treatments.**
  14. Guest R, Craig A, Perry K, Tran Y, Ephraums C, Hales A, et al. Resilience following spinal cord injury: a prospective controlled study investigating the influence of the provision of group cognitive behavior therapy during inpatient rehabilitation. *Rehabil Psychol.* 2015;60(4):311–21. <https://doi.org/10.1037/rep0000052>.
  15. Shin J, Chae J, Min J, Lee C, Hwang S, Lee B, et al. Resilience as a possible predictor for psychological distress in chronic spinal cord patients living in the community. *Ann Rehabil Med.* 2012;36(6):815–20. <https://doi.org/10.5535/arm.2012.36.6.815>.
  16. Livneh H, Martz E. Coping strategies and resources as predictors of psychosocial adaptation among people with spinal cord injury. *Rehabil Psychol.* 2014;59(3):329–39. <https://doi.org/10.1037/a0036733>.
  17. Monden KR, Trost Z, Catalano D, Garner AN, Symcox J, Driver S, et al. Resilience following spinal cord injury: a phenomenological view. *Spinal Cord.* 2014;52:197–201. <https://doi.org/10.1038/sc.2013.159>.
  18. Mehta S, Hadjistavropoulos HD, Earis D, Titov N, Dear BF. Patient perspectives of internet-delivered cognitive behavioral therapy for psychosocial issues post spinal cord injury. *J Rehabil Psychol.* 2019;64(3):351–9. <https://doi.org/10.1037/rep0000276>.
  19. Frann JR, Crane DA, Graves DE, Kalpakjian CZ, Tate DG, Bombardieri CH. Depression treatment preferences after acute traumatic spinal cord injury. *Arch Phys Med Rehabil.* 2013;94(12):2389–95. <https://doi.org/10.1016/j.apmr.2013.07.004>.
  20. Self-harm and suicide before and after spinal cord injury: a systematic review. *Spinal Cord.* 2017;55(1):2–7. <https://doi.org/10.1038/sc.2016.135>.
  21. Khazem LR. Physical disability and suicide: recent advancements in understanding and future directions for consideration. *Curr Opin Psychol.* 2018;22:18–22. <https://doi.org/10.1016/j.copsyc.2017.07.018>.
  22. Budd MA, Haque OS, Stein MA. Biases in the evaluation of self-harm in patients with disability due to spinal cord injury. *Spinal Cord Ser Cases.* 2020;6(43). <https://doi.org/10.1016/j.copsyc.2017.07.018>.
  23. Huang S, Wang W, Chou L, Liou T, Lin H. Risk of dementia in patients with spinal cord injury: a nationwide population-based cohort study. *J Neurotrauma.* 2017;34(3):615–22. <https://doi.org/10.1089/neu.2016.4525>.
  24. Sachdeva R, Gao F, Chan CCH, Krassioukov AV. Cognitive function after spinal cord injury: a systematic review. *Neurology.* 2018;91(13):611–21. <https://doi.org/10.1212/WNL.00000000000006244>.
  25. Engblom-Deglmann ML, Hamilton J. The impact of spinal cord injury on the couple relationship: a grounded theory exploration of the adjustment process. *J Couple Relationship Ther.* 2020;19(3):250–75. <https://doi.org/10.1080/15332691.2020.1746459>.
  26. Dispenza F, McElroy-Heltzel S, Tarziers K. Relationship adjustment and quality among sexual minority persons with disabilities. *Rehabil Psychol.* 2021;66(1):65–75. <https://doi.org/10.1037/rep0000362>.
  27. Earle S, O'Dell L, Davies A, Rixon A. Views and experiences of sex, sexuality and relationships following spinal cord injury: a systematic review and narrative syntheses of the qualitative literature. *Sex Disabil.* 2020;38:567–95. <https://doi.org/10.1007/s11195-020-09653-0>.
  28. Mona LR, Syme ML, Cameron RP, Clemency Cordes C, Fralley SS, Baggett LR, et al. Sexuality and disability: a disability-affirmative approach to sex therapy. In: Binik YM, Hall K, editors., et al., *Principles and practices of sex therapy*. 5th ed. New York: Guilford Press; 2014. p. 457–81.
  29. Ellis K, Sakellariou D. Occupational therapy's role empowering sexuality for individuals with disability. In: Shuttleworth R, Mona L, editors. *The Routledge Handbook of Disability and Sexuality*. Routledge; 2021. p. 463–73.
  30. Ruiz-Perez I, Pastor-Moreno G, Escriba-Aguir V, Maroto-Navarro G. Intimate partner violence in women with disabilities: perception of healthcare and attitudes of health professionals. *Disabil Rehabil.* 2018;40(9):1059–65. <https://doi.org/10.1080/09638288.2017.1288273>.
  31. Wagner CC, McMahon BT. Motivational interviewing and rehabilitation counseling practice. *Rehabil Couns Bull.* 2004;47(3):152–61. <https://doi.org/10.1177/00343552040470030401>.
  32. Wan F, Chien W, Chung C, Yang Y, Tzeng N. Association between traumatic spinal cord injury and affective and other psychiatric disorders—a nationwide cohort study and effects of rehabilitation therapies. *J Affect Disord.* 2020;265:381–8. <https://doi.org/10.1016/j.jad.2020.01.063>.
  33. Kratz AL, Murphy JF, Kalpakjian CZ, Chen P. Medicate or meditate? Greater pain acceptance is related to lower pain medication use in persons with chronic pain and spinal cord injury. *Clin J Pain.* 2018;34(4):357–65. <https://doi.org/10.1097/AJP.0000000000000550>.
  34. Warme CA, Turner JA, Marshall HM, Cardenas DD. Treatments for chronic pain associated with spinal cord injuries: many are tried, few are helpful. *Clin J Pain.* 2002;18(3):153–63. <https://doi.org/10.1097/00002508-200205000-00004>.
  35. Model Systems Knowledge Translation Center [Internet]. *SCI Factsheets: pain after spinal cord injury*; 2009 [cited 2021 Aug 12]. Available from: <https://msktc.org/sci/factsheets/pain>
  36. Chuang C, Chen C, Bai C, Chen P, Wu S, Liu C. Risk factors associated with newly psychiatric disorder in spinal cord injury:



- a retrospective cohort study. *J Clin Nurs*. 2017;27(5–6):e1038–47. <https://doi.org/10.1111/jocn.14139>.
37. Hadjipavlou G, Cortese AM, Ramaswamy B. Spinal cord injury and chronic pain. *BJA Education*. 2016;16(8):264–8. <https://doi.org/10.1093/bjaed/mkv073>.
  38. National Council on Independent Living (US). About the chronic pain/opioids task force. Washington D.C.: NCIL. Available from: <https://ncil.org/cpo/>
  39. Keefe F, Gil KM. Behavioral concepts in the analysis of chronic pain syndromes. *J Consult Clin Psychol*. 1986;54(6):776–83.
  40. Sankari A, Badr MS, Martin JL, Ayas NT, Berlowitz D. Impact of spinal cord injury on sleep: current perspectives. *Nat Sci Sleep*. 2019;11:219–29. <https://doi.org/10.2147/NSS.S197375>.
  41. Alcantara C, Consenso LG, McCullough E, Vogy T, Falzon AL, Ibarra IP. Cultural adaptations of psychological interventions for prevalent sleep disorders and sleep disturbances: a systematic review of randomized controlled trials in the United States. *Sleep Med Rev*. 2021;56:e101455. <https://doi.org/10.1016/j.smrv.2021.101455>.
  42. Ditre J, Radnitz CL. Pre- and postinjury substance misuse among veterans with spinal cord injury. *J Rehabil Psychol*. 2005;50(2):142–8. <https://doi.org/10.1037/0090-5550.50.2.14>.
  43. West SL, Luck RS, Capps CF. Physical inaccessibility negatively impacts the treatment participation of persons with disabilities. *Addict Behav*. 2007;32(7):1494–7. <https://doi.org/10.1016/j.addbeh.2006.10.009>.
  44. Bernardi M, Fedullo AL, Bernardi E, Munzi D, Peluso I, Myers J, Lista FR, Sciarra T. Diet in neurogenic bowel management: a viewpoint on spinal cord injury. *World J Gastroenterol*. 2020;26(20):2479–97. <https://doi.org/10.3748/wjg.v26.i20.2479>.
  45. Holm NJ, Moller T, Adamsen L, Dalsgaard LT, Biering-Sorensen F, Schou LH. Health promotion and cardiovascular risk reduction in people with spinal cord injury: physical activity, healthy diet and maintenance after discharge—protocol for a prospective national cohort study and a preintervention-postintervention study. *BMJ Open*. 2019;9(12):e030310. <https://doi.org/10.1136/bmjopen-2019-030310>.
  46. de Ridder D, Kroese F, Evers C, Adriaanse M, Gillebaart M. Healthy diet: health impact, prevalence, correlates, and interventions. *Psychol Health*. 2017;32(8):907–41. <https://doi.org/10.1080/08870446.2017.1316849>.
  47. An R, Chiu CY, Zhang Z, Burd NA. Nutrient intake among US adults with disabilities. *J Hum Nutr Diet*. 2014;28(5):465–75. <https://doi.org/10.1111/jhn.12274>.
  48. Vazquez-Farinas M, Rodriguez-Martin B. “Living with a fragmented body”: a qualitative study on perceptions about body changes after a spinal cord injury. *Int Spinal Cord Soc*. 2021;2(59):855–64. <https://doi.org/10.1038/s41393-021-00634-4>.
  49. ●● Perrin PB. Diversity and social justice in disability: the heart and soul of rehabilitation psychology. *J Rehabil Psychol*. 2019;64(2):105–10. <https://doi.org/10.1037/rep0000278>. **This article highlights the role of rehabilitation psychologists, emphasizing psychologists role in providing disability affirmative care and promoting equity, equality, and social justice within the practice of rehabilitation medicine.**
  50. Reid-Arndt S, Brenner L. Introduction. In: Brenner L, Reid-Arndt SA, Elliott T, Frank RG, Caplan B, editors. *Handbook of Rehabilitation Psychology*. 3rd ed. Washington: American Psychological Association; 2019. p. 279–302. <https://doi.org/10.1037/0000129-018>.
  51. Warren AM, Stucky K, Sherman J. Rehabilitation psychology’s role in the level I trauma center. *J Trauma Acute Care Surg*. 2013;74(5):1357–62. <https://doi.org/10.1097/TA.0b013e3182858ab9>.
  52. Dorstyn D, Mathias J, Dension L. Efficacy of cognitive behavior therapy for the management of psychological outcomes following spinal cord injury: a meta-analysis. *J Health Psychol*. 2010;16(2):374–91. <https://doi.org/10.1177/1359105310379063>.
  53. Mehta S, Orenczuk S, Hansen KT, Aubut JL, Hitzig S, Legassic M, et al. An evidence-based review of the effectiveness of cognitive behavioral therapy for psychosocial issues post-spinal cord injury. *Rehabil Psychol*. 2011;56(1):15–25. <https://doi.org/10.1037/a0022743>.
  54. Gang H, Lin BL, Hu JH, Qui Fh, Zhang WY, Zhang ZL, et al. Effect of acceptance and commitment therapy on rehabilitation patients with spinal cord injury. *Contemporary Clinical Trials Communications*. 2021; in press. <https://doi.org/10.1016/j.conctc.2021.100778>
  55. Khanjani MS, Kazemi J, Younesi J, Dadkhah A, Biglarian A, Barmi BE. The effect of acceptance and commitment therapy on psychological flexibility and emotional regulation in patients with spinal cord injuries: a randomized controlled trial. *Iran J Psychiatry Behav Sci*. 2021;15(2):e105378. <https://doi.org/10.5812/ijpbs.105378>.
  56. Olkin R. Disability-affirmative therapy: a case formulation template for clients with disabilities. *Academy of Rehabilitation Psychology Series*. Oxford; Oxford University Press. 2017.
  57. Chemtob K, Caron JG, Fortier MS, Latimer-Cheung AE, Zelaya W, Sweet S. Exploring the peer mentorship experiences of adults with spinal cord injury. *Rehabil Psychol*. 2018;63(4):542–52. <https://doi.org/10.1037/rep0000228.supp>.
  58. Matamala-Gomez M, Bottiroli S, Realdon O, Riva G, Galvagni L, Platz T, Sandrini G, DeIcco R, Tassorelli C. Telemedicine and virtual reality at time of COVID-19 pandemic: an overview for future perspectives in neurorehabilitation. *Front Neurol*. 2021;12:646902. <https://doi.org/10.3389/fneur.2021.646902>.
  59. Korner M. Interprofessional teamwork in medical rehabilitation: a comparison of multidisciplinary and interdisciplinary team approach. *Clin Rehabil*. 2010;24:745–55. <https://doi.org/10.1177/0269215510367538>.
  60. ● VanPuymbrouck L, Friedman C, Feldner H. Explicit and implicit disability attitudes of healthcare providers. *J Rehabil Psychol*. 2020;65(2):101–12. <https://doi.org/10.1037/rep0000317>. **This study highlights explicit and implicit disability biases that are common among healthcare providers, and discusses how these biases can negatively impact healthcare for people with disabilities.**
  61. Campbell FK. Exploring internalized ableism using critical race theory. *Disabil Soc*. 2008;23(2):151–62. <https://doi.org/10.1080/09687590701841190>.

**Publisher’s Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.