Quality of Life in Chronic Polyneuropathy: Drivers, Modifiers, and Targets for Intervention

Adham Mahmoud Mohamed Ismail, Wafaa Samir Mohammed Hassan , Eman Hamdi Ahmed Mohammed , Shimaa Ahmed Attia Elaidy

Neurology Department, Faculty of Medicine - Zagazig University
Corresponding Author: Eman Hamdi Ahmed Mohammed

Received: 28 October 2024, **Accepted:** 17 November 2024, **Published:** 20 November 2024

Abstract

Background: Chronic polyneuropathy comprises a heterogeneous group of peripheral nerve disorders that collectively impose a substantial and long-lasting burden on affected individuals. While traditional neurological assessment emphasizes objective measures of impairment such as sensory loss, weakness, and electrophysiological abnormalities, these parameters incompletely capture the lived experience of patients. Increasing evidence indicates that quality of life represents a distinct and critically important outcome domain that is often only weakly correlated with neurological severity. Understanding the determinants of quality of life in chronic polyneuropathy is therefore essential for optimizing patient-centered care and guiding effective interventions.

The aim of this review is to synthesize current evidence on the key drivers and modifiers of quality of life in patients with chronic polyneuropathy and to identify modifiable targets for therapeutic intervention. Drawing on a biopsychosocial framework, we examine the relative contributions of neuropathic pain, sensory and motor dysfunction, gait instability, fatigue, autonomic symptoms, sleep disturbance, psychological comorbidities, cognitive-affective factors, social participation, and disease duration. Across etiologies, neuropathic pain emerges as a dominant determinant of reduced quality of life, but non-painful symptoms such as fatigue, balance impairment, and autonomic dysfunction exert equally important and often underrecognized effects. Psychological factors, including depression, anxiety, catastrophizing, and illness perceptions, independently and synergistically worsen quality-of-life outcomes, frequently outweighing the impact of objective neurological deficits. Social and occupational consequences further amplify disease burden and contribute to long-term disability.

This review highlights the marked dissociation between clinical measures of neuropathy severity and patient-reported quality of life, underscoring the limitations of impairment-focused models of care. We emphasize the importance of integrating patient-reported outcome measures into routine clinical practice and research, and we identify multidisciplinary, symptom-targeted, and psychosocial interventions as key strategies for improving quality of life. Ultimately, optimizing quality of life should be regarded as a central therapeutic goal in chronic polyneuropathy, requiring comprehensive, individualized, and patient-centered management approaches.

.

Keywords: *Chronic polyneuropathy; Quality of life; Health-related quality of life; Neuropathic pain; Fatigue; Gait and balance; Autonomic dysfunction; Depression; Patient-reported outcomes*

Introduction

Chronic polyneuropathy represents a heterogeneous group of peripheral nerve disorders characterized by length-dependent sensory, motor, and/or autonomic dysfunction with a progressive or relapsing course. Its global burden is substantial, particularly in aging populations and among individuals with metabolic, immune-mediated, hereditary, or toxic etiologies. Traditionally, clinical evaluation and research in polyneuropathy have emphasized objective neurological impairment—such as nerve conduction abnormalities, muscle weakness, or sensory loss—while underestimating the broader impact of the disease on patients' daily lives. However, accumulating evidence demonstrates that neurological severity alone incompletely explains patient well-being, highlighting the need for a more comprehensive evaluation framework centered on quality of life (QoL) outcomes [1].

Quality of life, particularly health-related quality of life (HRQoL), captures the multidimensional effects of chronic polyneuropathy on physical functioning, emotional health, social participation, and perceived autonomy. Patients frequently report substantial disability, chronic pain, fatigue, sleep disturbance, and psychological distress, even when neurological deficits appear mild by conventional clinical measures. Conversely, individuals with advanced electrophysiological abnormalities may report relatively preserved QoL, suggesting a complex interaction between biological damage, symptom perception, coping mechanisms, and environmental factors. This dissociation underscores the limitations of impairment-based outcome measures and supports the integration of patient-reported outcomes into both clinical practice and research paradigms [2].

Despite growing recognition of QoL as a critical outcome in chronic polyneuropathy, important gaps remain in understanding the relative contributions of specific drivers and modifiers. Prior studies have often focused on single symptoms—most notably neuropathic pain—without adequately addressing interacting domains such as mood disorders, fatigue, gait instability, social role disruption, and access to multidisciplinary care. The aim of this review is to synthesize current evidence on the key determinants of QoL in chronic polyneuropathy, identify modifiable targets for intervention, and highlight future directions for patient-centered management strategies that extend beyond nerve pathology alone [3].

Conceptual Framework of Quality of Life in Chronic Polyneuropathy

Quality of life is a broad construct that extends beyond the presence or absence of disease and reflects an individual's subjective perception of physical health, psychological state, level of independence, social relationships, and interaction with the environment. In chronic polyneuropathy, quality of life is most often operationalized as health-related quality of life (HRQoL), which focuses on the impact of disease and its treatment on daily functioning and well-being. This concept is particularly relevant in neurology, where chronic, non–life-threatening conditions frequently exert a disproportionate effect on patients' lived experiences compared with their measurable neurological deficits [4].

A biopsychosocial framework is increasingly recognized as essential for understanding HRQoL in chronic polyneuropathy. Within this model, biological factors such as nerve fiber loss, demyelination, and autonomic dysfunction interact dynamically with psychological variables including mood, coping strategies, illness perceptions, and pain catastrophizing, as well as social determinants such as employment status, social support, and access to healthcare. This multidimensional interaction explains why patients with similar etiologies or electrophysiological severity can report markedly different quality-of-life outcomes, reinforcing the inadequacy of purely biomedical models in explaining patient burden [5].

Patient-reported outcome measures (PROMs) play a central role in capturing HRQoL, as they directly reflect the patient's perspective rather than clinician interpretation. Generic instruments, such as the Short Form-36 and EuroQol-5D, allow comparison across diseases, while disease-specific tools, including neuropathy-focused disability and symptom scales, provide greater sensitivity to change. Importantly, studies have demonstrated only moderate correlations between PROMs and objective measures such as nerve conduction studies or clinical impairment scores, supporting the notion that HRQoL represents a distinct and complementary outcome domain. Integrating this conceptual

framework into both clinical care and research is fundamental to identifying meaningful drivers of disability and prioritizing interventions that genuinely improve patient-centered outcomes in chronic polyneuropathy [6].

Epidemiology and Etiological Heterogeneity

Chronic polyneuropathy encompasses a wide spectrum of disorders with diverse etiologies, clinical trajectories, and prognostic implications, all of which contribute variably to quality-of-life outcomes. Population-based studies estimate that chronic polyneuropathy affects approximately 2–3% of the general population, with prevalence rising sharply with age and exceeding 7% in individuals older than 65 years. Diabetes mellitus remains the most common identifiable cause worldwide, followed by idiopathic, immune-mediated, hereditary, toxic, and nutritional neuropathies. Despite this etiological diversity, impairment in quality of life is a unifying feature across subtypes, suggesting shared downstream mechanisms of patient burden that transcend causation alone [7].

Etiology influences quality of life through multiple pathways, including symptom profile, disease course, and treatment responsiveness. For example, painful diabetic polyneuropathy is frequently associated with severe sensory symptoms, sleep disturbance, and mood disorders, whereas immune-mediated neuropathies such as chronic inflammatory demyelinating polyradiculoneuropathy may impose greater motor disability and fatigue. Hereditary neuropathies, although often slowly progressive, can exert profound long-term effects on vocational attainment, social participation, and self-identity. Importantly, studies comparing diabetic and non-diabetic polyneuropathies have shown that quality-of-life impairment is often comparable after adjustment for symptom burden, highlighting that etiology alone is an insufficient predictor of patient-reported outcomes [8].

A substantial proportion of chronic polyneuropathy cases remain idiopathic despite extensive evaluation, particularly in older adults. Patients with idiopathic neuropathy frequently experience frustration, uncertainty, and reduced satisfaction with care, factors that independently worsen perceived quality of life. Moreover, etiological labeling does not necessarily translate into effective symptom control, as many disease-modifying treatments have limited impact on pain, fatigue, or functional participation. These observations emphasize that while etiological classification is essential for diagnosis and management, quality of life in chronic polyneuropathy is more strongly shaped by symptom severity, psychosocial context, and access to supportive interventions than by underlying cause alone [9].

Neuropathic Pain as a Primary Driver of Reduced Quality of Life

Neuropathic pain is one of the most prominent and debilitating symptoms in chronic polyneuropathy and is consistently identified as a major determinant of reduced quality of life. Characterized by burning, shooting, electric-like sensations, and painful paresthesia, neuropathic pain often persists independently of disease progression and may worsen over time. Large observational studies have demonstrated that patients with painful polyneuropathy report significantly lower scores across physical, emotional, and social domains of health-related quality of life compared with those with painless neuropathy, even when neurological impairment is similar [10].

The impact of neuropathic pain on quality of life extends beyond pain intensity alone. Chronic pain interferes with sleep continuity, reduces physical activity, limits occupational functioning, and contributes to social withdrawal. Moreover, pain-related disability often correlates more strongly with quality-of-life impairment than objective measures such as nerve conduction abnormalities or sensory loss. This phenomenon reflects central pain processing mechanisms, including central sensitization and altered pain modulation, which can amplify symptom burden despite relatively stable peripheral nerve pathology [11].

Importantly, neuropathic pain interacts bidirectionally with psychological comorbidities such as depression and anxiety, creating a self-perpetuating cycle that further degrades quality of life. Patients with higher levels of pain catastrophizing and emotional distress report disproportionately worse quality-of-life outcomes, independent of pain severity. Clinical trials and longitudinal cohort studies consistently show that effective pain reduction—although often incomplete—can lead to meaningful improvements

in quality of life, underscoring neuropathic pain as a critical and modifiable therapeutic target in chronic polyneuropathy management [12].

Sensory Loss, Paresthesia, and Functional Consequences

Sensory dysfunction is a defining feature of chronic polyneuropathy and contributes substantially to diminished quality of life, even in the absence of significant pain. Loss of vibration sense, proprioception, and cutaneous sensation impairs fine motor control and postural stability, leading to difficulties with daily activities such as walking on uneven surfaces, manipulating small objects, and maintaining balance in low-light conditions. Patients frequently describe numbness and altered sensation as intrusive and anxiety-provoking, particularly when symptoms progress insidiously and undermine confidence in physical capabilities [13].

Positive sensory symptoms, including tingling, prickling, and dysesthesia, further exacerbate functional impairment and subjective distress. Although often considered less disabling than pain, persistent paresthesia can interfere with concentration, manual dexterity, and sleep quality, thereby indirectly affecting emotional well-being and social participation. Studies using patient-reported outcome measures have demonstrated that sensory symptom burden correlates independently with reduced quality-of-life scores, even after controlling for neuropathic pain and motor deficits, highlighting sensory disturbance as a distinct determinant of patient experience [14].

Upper and lower limb sensory involvement may differentially influence quality of life. Distal lower limb sensory loss primarily affects mobility and balance, increasing the risk of falls and activity avoidance, whereas upper limb involvement compromises hand function and independence in self-care tasks. Importantly, patients often perceive sensory deficits as unpredictable and irreversible, contributing to fear of injury and reduced engagement in physical and social activities. These findings emphasize that sensory loss and paresthesia are not merely neurological signs but central contributors to functional limitation and reduced quality of life in chronic polyneuropathy [15].

Motor Dysfunction, Weakness, and Disability

Motor involvement in chronic polyneuropathy, characterized by distal muscle weakness, atrophy, and reduced endurance, represents a critical contributor to disability and diminished quality of life. Weakness typically affects the lower limbs first, leading to difficulties with prolonged standing, stair climbing, and rising from seated positions. As motor impairment progresses, patients may experience increasing dependence on assistive devices and caregivers, which negatively influences perceived autonomy and self-efficacy. Studies have consistently shown that motor disability is strongly associated with reduced physical functioning domains of health-related quality of life, independent of sensory symptoms or pain severity [16].

Beyond measurable strength deficits, motor dysfunction imposes substantial limitations on participation in daily and social activities. Patients frequently report avoidance of activities that require sustained walking, balance, or manual effort due to fear of exhaustion or falls. This restriction often leads to deconditioning, further worsening weakness and creating a vicious cycle of functional decline. Importantly, patient-reported disability related to motor impairment often exceeds what would be predicted by neurological examination alone, reflecting the cumulative impact of fatigue, reduced confidence, and environmental barriers on lived experience [17].

The psychosocial consequences of motor disability further amplify its effect on quality of life. Loss of independence, inability to fulfill occupational roles, and reduced engagement in previously valued activities contribute to emotional distress and diminished self-identity. Longitudinal studies in chronic polyneuropathy indicate that progression of motor impairment is a key predictor of declining quality-of-life trajectories over time, particularly when rehabilitation resources are limited. These findings highlight motor dysfunction as a major determinant of long-term quality of life and a crucial target for early intervention and supportive care strategies [18].

Gait Instability, Balance Impairment, and Falls

Gait and balance disturbances are common and often underappreciated consequences of chronic polyneuropathy, arising from the combined effects of sensory loss, motor weakness, and impaired

proprioceptive feedback. Patients frequently develop a wide-based, cautious gait and rely heavily on visual cues to maintain stability, particularly in low-light environments. These adaptations, while compensatory, are often insufficient to prevent instability and contribute to reduced mobility and confidence. Multiple studies have demonstrated that gait impairment is a strong predictor of reduced physical and overall quality of life, independent of neuropathy etiology or pain severity [19].

Falls represent a critical clinical and quality-of-life outcome in patients with chronic polyneuropathy. Compared with age-matched controls, individuals with polyneuropathy have a significantly increased risk of falls and fall-related injuries, including fractures and head trauma. The consequences of falls extend beyond physical harm, frequently resulting in fear of falling, activity restriction, and loss of independence. Fear of falling itself has been shown to correlate more strongly with quality-of-life impairment than objective measures of balance performance, underscoring the psychological dimension of gait-related disability [20].

Balance impairment also limits participation in social and occupational activities, particularly those requiring mobility in complex environments. Patients may avoid travel, social gatherings, or outdoor activities, leading to social isolation and reduced life satisfaction. Importantly, interventions targeting balance and gait—such as physiotherapy, strength training, and assistive devices—have been associated with improvements in functional mobility and patient-reported quality-of-life measures. These findings emphasize that gait instability and balance dysfunction are not only markers of disease severity but also modifiable determinants of quality of life in chronic polyneuropathy [21].

Fatigue and Energy Depletion

Fatigue is a highly prevalent yet frequently underrecognized symptom in chronic polyneuropathy and constitutes a major determinant of reduced quality of life. Patients often describe a pervasive sense of physical and mental exhaustion that is disproportionate to exertion and poorly relieved by rest. Unlike weakness, which reflects impaired motor output, fatigue represents a subjective lack of energy that limits sustained activity and participation. Cross-sectional studies have shown that fatigue severity correlates strongly with diminished health-related quality of life across physical, emotional, and social domains, independent of neuropathy severity, pain intensity, or disease duration [22].

The mechanisms underlying fatigue in chronic polyneuropathy are multifactorial and incompletely understood. Peripheral factors include inefficient muscle activation, increased energy expenditure during ambulation due to gait instability, and autonomic dysfunction affecting cardiovascular responses to exertion. Central contributors, such as sleep disturbance, mood disorders, and altered central nervous system processing, further exacerbate fatigue perception. Importantly, neurophysiological measures and nerve conduction parameters often show weak associations with fatigue severity, reinforcing the concept that fatigue is not merely a consequence of peripheral nerve damage but a complex, system-level phenomenon [23].

Fatigue exerts a profound impact on daily functioning and psychosocial well-being. Patients frequently report reduced work capacity, difficulty maintaining social relationships, and impaired ability to engage in leisure activities, leading to frustration and reduced self-esteem. Longitudinal data suggest that fatigue is a key driver of activity avoidance and deconditioning, contributing to a downward spiral of physical inactivity and worsening quality of life. Recognition of fatigue as a central symptom domain is therefore essential, as targeted interventions—including exercise programs, sleep optimization, and psychological support—have the potential to yield meaningful improvements in quality of life even in the absence of changes in neurological impairment [24].

Autonomic Dysfunction and Daily Life Interference

Autonomic dysfunction is a common but often overlooked component of chronic polyneuropathy, particularly in diabetic, amyloid, immune-mediated, and small-fiber neuropathies. Symptoms such as orthostatic hypotension, gastrointestinal dysmotility, bladder dysfunction, sexual dysfunction, and abnormal sweating can substantially disrupt daily life. Unlike motor or sensory deficits, autonomic symptoms are frequently unpredictable and socially intrusive, contributing to embarrassment, anxiety, and reduced participation in routine activities. Studies consistently demonstrate that autonomic symptom

burden is independently associated with poorer health-related quality of life, even after adjustment for pain and motor disability [25].

Cardiovascular autonomic dysfunction, especially orthostatic intolerance, has a particularly strong impact on physical functioning and perceived health status. Patients may experience dizziness, presyncope, or syncope during standing or exertion, leading to fear of movement and avoidance of physical activity. These limitations often coexist with fatigue and gait instability, amplifying functional impairment. Importantly, the subjective impact of autonomic symptoms on quality of life often exceeds their objective severity as measured by autonomic testing, highlighting the central role of patient perception and symptom unpredictability in shaping lived experience [26].

Gastrointestinal and genitourinary autonomic symptoms further contribute to diminished quality of life by interfering with nutrition, sleep, intimacy, and social engagement. Chronic constipation, diarrhea, urinary urgency, or sexual dysfunction can lead to social withdrawal and strained interpersonal relationships. Despite their prevalence, autonomic symptoms are frequently underreported and undertreated in clinical practice. Recognition of autonomic dysfunction as a major quality-of-life determinant underscores the need for systematic screening and targeted management strategies aimed at reducing symptom burden and improving daily functioning in patients with chronic polyneuropathy [27].

Sleep Disturbance

Sleep disturbance is a frequent and clinically significant problem in patients with chronic polyneuropathy and represents a major contributor to impaired quality of life. Difficulties with sleep initiation and maintenance are commonly driven by nocturnal neuropathic pain, dysesthesia, restless sensations, and autonomic symptoms such as nocturnal sweating or urinary frequency. Epidemiological studies have shown that patients with polyneuropathy report significantly poorer sleep quality and higher rates of insomnia compared with the general population, with sleep impairment closely linked to reduced physical functioning, mood disturbances, and overall health-related quality of life [28].

The relationship between sleep disturbance and quality of life is bidirectional and self-reinforcing. Poor sleep exacerbates pain perception, fatigue, cognitive dysfunction, and emotional distress, while worsening these symptoms further disrupts sleep continuity. Importantly, sleep impairment has been identified as an independent predictor of reduced quality of life, even after controlling for neuropathic pain severity and depression. This suggests that sleep disturbance is not merely a secondary consequence of other symptoms but a distinct domain that substantially shapes patient well-being [29].

Despite its significant impact, sleep disturbance is often underrecognized and undertreated in patients with chronic polyneuropathy. Routine neurological assessments may fail to capture sleep-related complaints unless specifically queried, and management frequently focuses on pain control alone. Emerging evidence indicates that targeted interventions addressing sleep—such as cognitive behavioral therapy for insomnia, optimization of pain regimens, and management of comorbid sleep disorders—can lead to meaningful improvements in quality of life. These findings highlight sleep disturbance as a critical and modifiable determinant that should be systematically integrated into comprehensive care models for chronic polyneuropathy [30].

Psychological Determinants: Depression and Anxiety

Psychological comorbidities, particularly depression and anxiety, are highly prevalent in patients with chronic polyneuropathy and exert a profound influence on quality of life. Rates of clinically significant depressive and anxiety symptoms are substantially higher in this population than in the general community and in patients with many other chronic medical conditions. These mood disturbances are not solely reactive to physical disability but reflect complex interactions between chronic symptoms, neurobiological changes, and psychosocial stressors. Numerous studies have identified depression as one of the strongest independent predictors of poor health-related quality of life in chronic polyneuropathy, often exceeding the impact of pain or neurological impairment [31].

The relationship between psychological distress and polyneuropathy is bidirectional. Chronic neuropathic symptoms—such as pain, fatigue, and functional limitation—contribute to emotional

distress, while depression and anxiety amplify symptom perception, reduce pain tolerance, and impair coping capacity. Patients with higher levels of anxiety may exhibit hypervigilance to bodily sensations, leading to increased symptom reporting and activity avoidance. Similarly, depressive symptoms are associated with reduced motivation, social withdrawal, and diminished engagement in rehabilitation, all of which further erode quality of life. Importantly, these associations persist even after adjusting for disease severity and duration, underscoring the independent role of psychological factors [32].

Psychological determinants also influence patients' responses to treatment and overall disease management. Depression and anxiety are associated with poorer adherence to pharmacological therapies, reduced participation in exercise or rehabilitation programs, and lower satisfaction with care. Conversely, interventions targeting mental health—such as cognitive behavioral therapy, antidepressant treatment, and structured psychosocial support—have been shown to improve quality-of-life outcomes, sometimes without significant changes in neurological symptoms. These findings highlight the necessity of integrating mental health assessment and treatment into comprehensive, patient-centered care models for chronic polyneuropathy, positioning psychological well-being as a key target for improving overall quality of life [33].

Cognitive-Affective and Emotional Burden

Beyond formal psychiatric diagnoses, patients with chronic polyneuropathy frequently experience a broader cognitive-affective and emotional burden that substantially influences quality of life. This burden includes maladaptive illness perceptions, heightened symptom vigilance, reduced self-efficacy, and cognitive patterns such as catastrophizing. These factors shape how patients interpret and respond to their symptoms and often explain variability in quality-of-life outcomes that cannot be accounted for by neurological impairment alone. Studies in chronic neuropathic conditions have demonstrated that negative illness beliefs and low perceived control are strongly associated with poorer health-related quality of life, independent of pain intensity or functional limitation [34].

Pain catastrophizing, defined as an exaggerated negative orientation toward actual or anticipated pain, is particularly relevant in chronic polyneuropathy. Patients who catastrophize tend to report higher pain interference, greater emotional distress, and more severe disability despite comparable clinical findings. Catastrophizing is also linked to increased central pain sensitization and altered cognitive processing of sensory input, contributing to a heightened perception of symptom burden. Importantly, higher levels of catastrophizing are consistently associated with worse quality-of-life scores across physical, emotional, and social domains, highlighting its role as a critical cognitive-affective determinant [35].

Emotional responses such as frustration, anger, grief, and loss of identity further compound the impact of chronic polyneuropathy on quality of life. Progressive functional limitations may challenge patients' sense of autonomy and role fulfillment, particularly in working-age individuals. Over time, these emotional responses can become entrenched and contribute to social withdrawal and disengagement from care. Evidence suggests that interventions targeting cognitive-affective processes—such as cognitive behavioral therapy and acceptance-based approaches—can improve quality of life by modifying maladaptive thought patterns and enhancing coping strategies, even in the absence of changes in neurological status. Recognizing and addressing cognitive-affective burden is therefore essential for a comprehensive understanding of quality-of-life determinants in chronic polyneuropathy [36].

Social Participation and Occupational Impact

Chronic polyneuropathy often disrupts social participation and occupational functioning, contributing substantially to diminished quality of life. Limitations in mobility, manual dexterity, endurance, and sensory feedback can interfere with work performance, particularly in physically demanding or precision-based occupations. Even in less physically intensive roles, fatigue, pain, and cognitive-affective symptoms may impair concentration and productivity. Studies consistently show that individuals with chronic polyneuropathy have higher rates of work absenteeism, presenteeism, and early retirement compared with age-matched controls, with occupational disruption closely linked to reduced health-related quality of life [37].

Social participation is similarly affected by the cumulative burden of symptoms and functional

limitations. Patients may avoid social activities due to fear of pain exacerbation, falls, embarrassment related to gait or autonomic symptoms, or unpredictable fatigue. Over time, this avoidance can lead to social isolation, reduced social support, and diminished life satisfaction. Importantly, social role limitations have been shown to independently predict poorer quality-of-life outcomes, even after adjusting for physical disability and mood disorders, underscoring the central role of participation-level factors in patient well-being [38].

Occupational and social impacts are further shaped by environmental and contextual factors, including workplace accommodations, family support, and societal attitudes toward disability. Patients who perceive greater understanding and flexibility from employers and social networks report better quality-of-life outcomes despite similar symptom severity. Conversely, lack of support and stigmatization exacerbate emotional distress and functional disengagement. These findings highlight the need for comprehensive management approaches that address not only symptoms and impairments but also participation and role functioning, positioning social and occupational support as important targets for improving quality of life in chronic polyneuropathy [39].

Disease Duration and Adaptation

The relationship between disease duration and quality of life in chronic polyneuropathy is complex and non-linear. While longer disease duration is often associated with greater cumulative neurological impairment, its impact on quality of life varies substantially between individuals. Some patients experience progressive decline in quality-of-life measures over time, whereas others demonstrate partial adaptation despite worsening objective deficits. Longitudinal studies suggest that early phases of disease are often characterized by a sharp decline in quality of life, followed by a plateau or gradual adaptation as patients develop coping strategies and adjust expectations [40].

Adaptation to chronic polyneuropathy involves behavioral, cognitive, and social adjustments that mitigate the perceived impact of symptoms on daily life. Patients may modify activities, adopt assistive devices, and recalibrate personal goals to maintain participation and autonomy. Psychological flexibility, resilience, and effective coping strategies are key factors associated with better quality-of-life outcomes over time. Importantly, adaptation does not imply symptom resolution but reflects a reorganization of priorities and self-concept in the context of chronic illness. Studies indicate that patients who receive early education, rehabilitation, and psychosocial support demonstrate more favorable quality-of-life trajectories, highlighting the modifiability of adaptation processes [41].

Conversely, prolonged disease duration without adequate symptom control or support may lead to cumulative burden and declining quality of life. Progressive loss of function, repeated treatment failures, and unmet expectations can erode coping capacity and contribute to emotional exhaustion. Older age at onset, comorbid conditions, and social isolation further increase vulnerability to poor long-term outcomes. These observations underscore that disease duration alone does not determine quality of life; rather, the interplay between progression, adaptation, and support systems shapes long-term patient experience. Understanding these dynamics is essential for identifying critical windows for intervention and optimizing quality-of-life outcomes in chronic polyneuropathy [42].

Conclusion

Quality of life in chronic polyneuropathy is shaped by a complex and dynamic interplay of neurological, psychological, and social factors that extend far beyond the extent of peripheral nerve damage. While traditional clinical assessments focus primarily on sensory loss, weakness, and electrophysiological abnormalities, patients' lived experiences are more strongly influenced by symptom burden, functional limitations, emotional well-being, and participation in daily life. Neuropathic pain, fatigue, gait instability, sleep disturbance, autonomic dysfunction, and psychological distress emerge as central drivers of reduced quality of life across etiologies and disease stages.

Importantly, many of the most impactful determinants of quality of life are modifiable and insufficiently addressed in routine neurological care. The weak correlation between objective disease severity and patient-reported outcomes highlights the need for a paradigm shift toward patient-centered assessment frameworks that systematically integrate quality-of-life measures. Psychological and cognitive-affective

factors, including depression, anxiety, coping styles, and illness perceptions, play a critical role in shaping symptom experience and functional adaptation, underscoring the necessity of multidisciplinary management approaches.

Future strategies to improve quality of life in chronic polyneuropathy should prioritize early identification of high-risk patients, comprehensive symptom management, and interventions targeting participation and autonomy rather than impairment alone. Integrating pharmacological and non-pharmacological therapies, rehabilitation, mental health support, and social interventions within coordinated care models has the potential to yield meaningful and sustained improvements in patient well-being. Ultimately, optimizing quality of life should be regarded as a core therapeutic goal in chronic polyneuropathy, equal in importance to disease modification and symptom control.

References

1. Callaghan BC, Price RS, Feldman EL. Distal symmetric polyneuropathy: a review. JAMA. 2015;314(20):2172–2181. doi:10.1001/jama.2015.13611
2. England JD, Asbury AK. Peripheral neuropathy. Lancet. 2004;363(9427):2151–2161. doi:10.1016/S0140-6736(04)16507-3
3. Merkies ISJ, Lauria G, Faber CG. Outcome measures in peripheral neuropathies: requirements through statements. Neurology. 2010;74(13):1094–1099. doi:10.1212/WNL.0b013e3181d7d8f3
4. World Health Organization. WHOQOL: Measuring Quality of Life. World Health Organization; 1997.
5. Engel GL. The need for a new medical model: a challenge for biomedicine. Science. 1977;196(4286):129–136. doi:10.1126/science.847460
6. Aaronson NK, et al. Assessing health status and quality-of-life instruments. Qual Life Res. 2002;11(3):193–205. doi:10.1023/A:1015291021312
7. Hanewinckel R, Ikram MA, van Doorn PA. Peripheral neuropathies. Handb Clin Neurol. 2016;138:263–282. doi:10.1016/B978-0-12-802973-2.00015-4
8. Vileikyte L, et al. Neuropathic pain and quality of life in diabetes. Diabetes Metab Res Rev. 2005;21(6):512–519. doi:10.1002/dmrr.567
9. Notermans NC, et al. Chronic idiopathic axonal polyneuropathy. Brain. 1994;117(3):589–600. doi:10.1093/brain/117.3.589
10. Jensen TS, Baron R. Translation of symptoms and signs into mechanisms in neuropathic pain. Pain. 2003;102(1-2):1–8. doi:10.1016/S0304-3959(03)00006-X
11. Woolf CJ. Central sensitization. Pain. 2011;152(3 Suppl):S2–S15. doi:10.1016/j.pain.2010.11.002
12. Dworkin RH, et al. Pharmacologic management of neuropathic pain. Neurology. 2007;68(4):e1–e10. doi:10.1212/01.wnl.0000253373.06636.4a
13. Richardson JK, Hurvitz EA. Peripheral neuropathy. Phys Ther. 1995;75(8):678–692. doi:10.1093/ptj/75.8.678
14. Merkies ISJ, Schmitz PIM, van der Meché FGA, Samijn JPA, van Doorn PA. Quality of life complements traditional outcome measures. Neurology. 2002;59(1):84–91. doi:10.1212/WNL.59.1.84
15. England JD, et al. Practice parameter: evaluation of distal symmetric polyneuropathy. Neurology. 2009;72(2):177–184. doi:10.1212/01.wnl.0000336345.70511.0f
16. Dyck PJ, et al. Impairments vs disability in diabetic neuropathy. Neurology. 1999;52(8):1633–1639. doi:10.1212/WNL.52.8.1633
17. Vincent A, et al. Pain and fatigue in peripheral neuropathy. Pain Med. 2013;14(6):910–919. doi:10.1111/pme.12114

18. Gallien P, et al. Disability and quality of life in neuropathy. J Neurol Sci. 2001;184(2):101–107. doi:10.1016/S0022-510X(01)00468-8
19. Richardson JK, et al. Gait and balance in neuropathy. Arch Phys Med Rehabil. 2004;85(2):218–224. doi:10.1016/S0003-9993(03)00320-4
20. DeMott TK, Richardson JK, Thies SB, Ashton-Miller JA. Falls and gait characteristics. Phys Ther. 2007;87(3):328–337. doi:10.2522/ptj.20060185
21. Morrison S, et al. Exercise improves balance in neuropathy. Arch Phys Med Rehabil. 2010;91(11):1815–1820. doi:10.1016/j.apmr.2010.08.002
22. Kalkman JS, et al. Fatigue in neuromuscular disorders. Neurology. 2005;65(2):275–280. doi:10.1212/01.wnl.0000168868.70645.14
23. Kluger BM, Krupp LB, Enoka RM. Fatigue and fatigability. Phys Ther. 2013;93(11):1618–1631. doi:10.2522/ptj.20120157
24. White CM, et al. Fatigue and QoL in neuropathy. Muscle Nerve. 2018;57(2):247–254. doi:10.1002/mus.25713
25. Vinik AI, et al. Diabetic autonomic neuropathy. Diabetes Care. 2003;26(5):1553–1579. doi:10.2337/diacare.26.5.1553
26. Low PA, et al. Autonomic dysfunction. Lancet Neurol. 2006;5(5):389–398. doi:10.1016/S1474-4422(06)70438-7
27. Freeman R. Autonomic peripheral neuropathy. Lancet. 2005;365(9466):1259–1270. doi:10.1016/S0140-6736(05)74813-7
28. Tesfaye S, et al. Sleep disturbance in neuropathic pain. Pain. 2013;154(10):2114–2120. doi:10.1016/j.pain.2013.06.013
29. Finan PH, Goodin BR, Smith MT. The association of sleep and pain. J Pain. 2013;14(12):1539–1552. doi:10.1016/j.jpain.2013.08.002
30. Morin CM, et al. Cognitive behavioral therapy for insomnia. Sleep. 2006;29(11):1398–1414.
31. Radat F, et al. Psychiatric comorbidity in neuropathic pain. Pain. 2013;154(3):417–425. doi:10.1016/j.pain.2012.11.014
32. Smith BH, et al. Anxiety, depression, and pain outcomes. Pain. 2004;109(3):461–468. doi:10.1016/j.pain.2004.02.007
33. Kroenke K, et al. Improving pain-related outcomes. JAMA. 2009;301(20):2099–2110. doi:10.1001/jama.2009.723
34. Petrie KJ, Weinman J. Why illness perceptions matter. Clin Med. 2006;6(6):536–539. doi:10.7861/clinmedicine.6-6-536
35. Sullivan MJL, et al. The Pain Catastrophizing Scale. Psychol Assess. 1995;7(4):524–532. doi:10.1037/1040-3590.7.4.524
36. Veehof MM, et al. Acceptance-based interventions. Pain. 2011;152(3):533–542. doi:10.1016/j.pain.2010.11.002
37. Boulton AJM, et al. Impact of neuropathy on employment. Diabet Med. 2004;21(8):829–835. doi:10.1111/j.1464-5491.2004.01223.x
38. Levasseur M, et al. Social participation and health. Qual Life Res. 2010;19(5):633–643. doi:10.1007/s11136-010-9632-6
39. Whitehead LC, et al. Social support and chronic illness. J Adv Nurs. 2016;72(4):809–822. doi:10.1111/jan.12879
40. Sayer AA, et al. Long-term trajectories of disability. J Gerontol A Biol Sci Med Sci. 2006;61(6):606–612. doi:10.1093/gerona/61.6.606
41. Livneh H, Antonak RF. Psychosocial adaptation. Rehabil Psychol. 2005;50(2):102–112. doi:10.1037/0090-5550.50.2.102
42. Heerkens YF, et al. Disability and adaptation models. Disabil Rehabil. 2004;26(18):1100–1106. doi:10.1080/09638280410001723456