

Effects of Exercise In Polio Survivors



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About me

Consultant

Collaborator with Polio Australia since 2012

Exercise physiologist (since 2011)

Private practice, community health, research

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Neurological and musculoskeletal health, precision health, health care regulation

Active

Two boys: aged 5 and 7 years

Family, running, rowing, strength

Foundations and context

Purpose and Scope of Exercise for Polio Survivors



Understanding Polio Survivors' Needs

Polio survivors face long-term muscle weakness, fatigue, and mobility challenges requiring tailored exercise approaches.

Safe and Effective Exercise Principles

Exercise should be individualized, non-fatiguing, and carefully monitored to improve health without causing harm.

Empowering Through Education

Educating survivors to listen to their bodies and collaborate with health professionals supports confidence and independence.

Focus on Function and Wellbeing

Exercise aims to support daily function, reduce health risks, and enhance mood and participation in life.

Who Are Polio Survivors Today?



Diverse Survivors' Experiences

Polio survivors vary widely in age, severity of infection, and rehabilitation access, resulting in different life experiences and mobility needs.

Neuromuscular Adaptations

Motor neurons adapt by sprouting branches to reinnervate muscles, enabling recovery but causing vulnerability to fatigue later.

Physical and Psychosocial Challenges

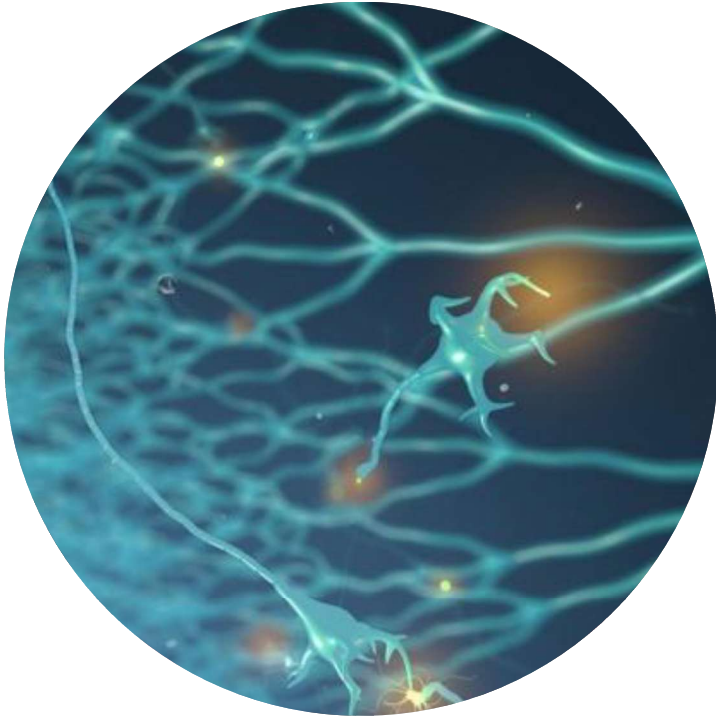
Many survivors face fluctuating energy, pain, balance issues, and fear of falling, affecting their daily life and activity levels.

Importance of Flexible Exercise

Exercise programs must respect individual goals and capabilities to support independence and maintain functional mobility.

Understanding post-polio physiology

How Polio affects muscles and nerves



Motor Neuron Damage

Poliomyelitis damages motor neurons, reducing nerve supply to muscle fibers and causing weakness.

Enlarged Motor Units

Surviving neurons sprout new connections, creating larger motor units that restore strength but reduce efficiency.

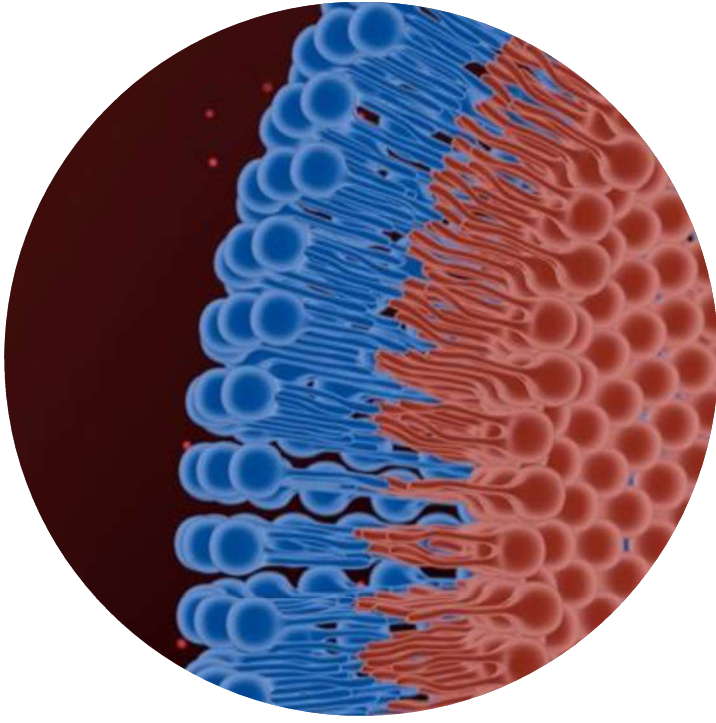
Muscle Fatigue and Weakness

Enlarged motor units fatigue quickly, leading to muscle weakness over time despite initial strength.

Exercise Implications

Exercise must be conservative to avoid overstressing motor units and preserve existing muscle function.

Why Muscles Tire More Easily After Polio



Reduced Motor Neurons

Fewer motor neurons cause each to activate more muscle fibers, increasing metabolic demand and fatigue.

Compensatory Muscle Strain

Compensatory movements strain unaffected muscles, spreading fatigue throughout the body.

Delayed Fatigue Response

Fatigue symptoms often worsen hours after activity, making cause and effect difficult to link.

Importance of Recovery Monitoring

Monitoring recovery time helps determine appropriate activity levels and prevents overuse injuries.

Late Effects of Polio and Post-Polio Syndrome



Late Effects of Polio

New or worsening symptoms can occur decades after initial polio infection despite previous stability.

Post-Polio Syndrome Symptoms

Characterized by new muscle weakness, fatigue, pain, and reduced endurance without other medical causes.

Overuse Phenomenon

Expanded motor units demand high metabolic effort; overuse causes gradual nerve damage and weakness.

Exercise Guidelines

Exercise must be carefully dosed with rest and pacing; high-intensity loading can worsen symptoms.

Energy, Fatigue, and Overuse



Complex Causes of Fatigue

Fatigue in polio survivors arises from neuromuscular and cardiovascular factors, not simple tiredness resolved by sleep.

Energy Demand in Daily Tasks

Everyday activities require more effort for polio survivors due to larger, less efficient motor units.

Managing Overuse and Recovery

Overuse accelerates muscle weakness; managing energy with pacing and assistive devices preserves function.

Exercise within Energy Budgets

Exercise should fit within an individual's energy capacity to avoid cumulative fatigue and ensure sustainability.

Principles of safe exercise

The Core Principle: Do No Harm



Principle of No Harm

Exercise must support health without causing delayed weakness, pain, or fatigue in polio survivors.

Prioritize Quality Over Quantity

Focus on quality and sustainability of movement rather than rapid or excessive exertion.

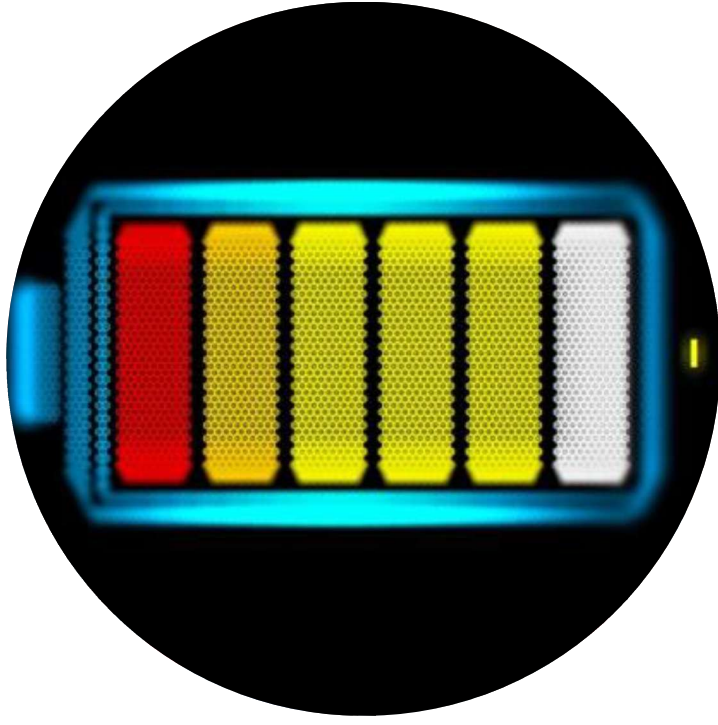
Avoid Straining Weak Muscles

Muscles with significant weakness should receive stretching or support instead of traditional strengthening.

Importance of Recovery

Rest and recovery days are essential to allow return to baseline function within 24 hours.

The Energy Envelope Concept



Finite Daily Energy

Each individual has a limited amount of energy available daily for all activities including exercise and work.

Balancing Activity and Rest

Maintaining balance between activity and rest prevents fatigue, pain, and functional decline from energy depletion.

Energy Visualization Tools

Using visuals like a fuel gauge helps individuals plan days and manage energy with realistic goals and pacing.

Focus on Stability

Consistent activity within the envelope prioritizes maintaining stability over expanding energy limits or endurance.

The 20% Rule and Non-Fatiguing Exercise



20% Rule for Exercise

Begin exercising at 20% below fatigue to avoid overexertion and promote safety in rehabilitation.

Non-Fatiguing Exercise Benefits

Non-fatiguing exercise stimulates cardiovascular and musculoskeletal systems without causing overuse.

Flexible, Responsive Approach

Adjust exercise intensity on low-energy days to maintain consistency and prevent setbacks.

Slow, Cautious Progression

Progress exercise gradually over weeks to ensure safety and sustained improvement.

Types of exercise

Strengthening: When and How



Selective Muscle Strengthening

Strengthening targets muscles with antigravity strength and full, pain-free motion for safe and effective exercise.

Low to Moderate Resistance

Use low to moderate resistance with controlled movements, emphasizing isometric or low-load isotonic exercises.

Warning Signs and Reassessment

Symptoms like cramping, pain, or next-day weakness may require immediate reassessment by a qualified health practitioner.

Integrated Strengthening Program

Strengthening should be part of a comprehensive program including rest, stretching, and energy conservation strategies.

Aerobic Exercise and Cardiovascular Fitness



Benefits of Aerobic Exercise

Aerobic exercise improves cardiovascular health, endurance, and mental wellbeing when adapted to individual needs.

Recommended Low-Impact Activities

Walking, stationary cycling, pool exercise, and arm ergometry are low-impact aerobic options suitable for many.

Exercise Intensity and Safety

Moderate intensity allowing comfortable conversation is key; high intensity may exceed energy limits and should be avoided.

Personalized Frequency and Duration

Exercise sessions should start short with ample recovery and be adjusted based on symptoms and perceived exertion.

Monitoring and adapting exercise

Listening to the Body



Self-Monitoring Importance

Self-monitoring empowers safe exercise by integrating physical, respiratory, and muscular feedback, especially for those with neuromuscular conditions.

Recognizing Overexertion Signs

Early signs like gait changes, increased effort, or reduced concentration help prevent exercise setbacks and promote safety.

Activity and Symptom Diary

Keeping a simple diary helps identify which activities restore energy and which drain it, improving exercise planning.

Respecting Bodily Signals

Listening to the body with permission to rest fosters better outcomes and higher participation in valued daily activities.

Using Perceived Exertion

1 - 10 Borg Rating of Perceived Exertion Scale		
0	Rest	
1	Really Easy	
2	Easy	
3	Moderate	
4	Sort of Hard	
5	Hard	
		6
		7
		8
		9
		10

Regulating Exercise Intensity

Perceived exertion helps individuals regulate exercise based on how hard activities feel, enhancing safety and effectiveness.

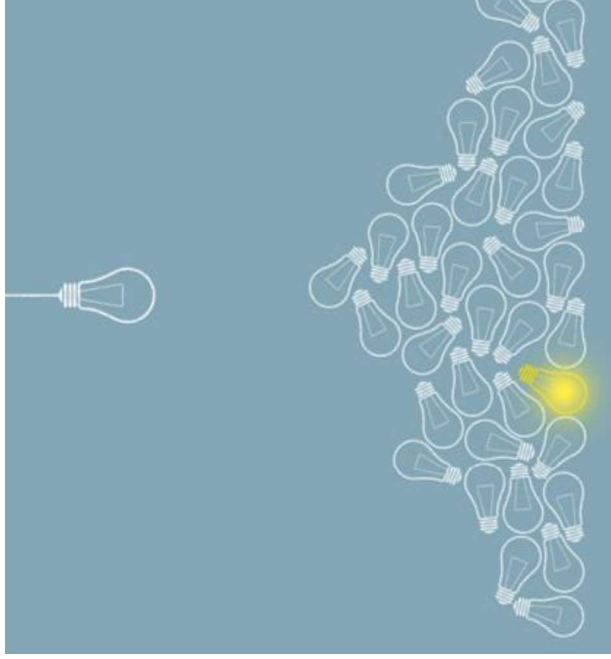
Empowering Internal Cues

Trusting internal cues respects individual variability and empowers those managing fluctuating energy levels during exercise.

Communication with Clinicians

Using perceived exertion scales creates a shared language between patients and clinicians for safer exercise progression.

Pacing and Planned Rest



Activity Segmentation

Breaking tasks into smaller parts with rest prevents energy depletion and promotes sustainable effort.

Mindful Energy Use

Pacing encourages awareness of energy levels to avoid overexertion and delayed fatigue.

Improved Consistency

This strategy supports steady progress by balancing activity with planned rest over time.

Regaining Control

Teaching pacing helps individuals manage symptoms and regain control over their energy.

Risks, warning signs, and prevention

Warning signs of overdoing it



Common Warning Signs

Muscle or joint pain and excessive fatigue lasting over 24 hours signal potential overuse injury.

Delayed Symptoms Importance

Delayed symptoms indicate activity exceeded the body's capacity and need careful attention.

Activity Diary Benefits

Keeping an activity diary helps identify patterns and triggers to avoid overdoing it.

Early Response Actions

Reducing exercise intensity, duration, or frequency early can prevent further physical decline.

Balance and Falls Prevention



Falls Risk Factors

Muscle weakness, fatigue, and balance impairments increase fall risk for polio survivors.

Exercise and Balance Training

Incorporate balance, strength, and endurance exercises to improve stability and reduce falls.

Environmental and Supportive Measures

Use environmental modifications, proper footwear, and assistive devices to enhance safety.

Holistic Fall Prevention

Avoid unsafe situations and support confidence for daily life participation.

Planning and long-term management

Building a weekly exercise plan



Balanced Exercise Components

Include gentle strengthening, aerobic activity, and flexibility exercises for a well-rounded weekly plan.

Energy and Life Balance

Exercise plans should fit within individual energy limits and accommodate other life demands for sustainability.

Consistency Over Intensity

Maintaining regular exercise sessions is more important than the intensity of workouts for long-term benefits.

Adaptability of Plans

Plans should be reviewed and adjusted regularly to accommodate illness, stress, or aging.

Mental health, confidence
and participation

Mental Health, Confidence, and Participation



Psychological Benefits of Exercise

Exercise reduces anxiety and depression while enhancing mood and sleep quality for individuals with disabilities.

Restoring Confidence

Supportive exercise helps rebuild body confidence for those with repeated functional loss.

Social Connection and Participation

Group or supervised exercise programs encourage social interaction and reduce isolation among participants.

Meaningful and Manageable Activity

Exercise aligned with personal goals supports independence and comfort without pushing limits.

Key take-home messages

An illustration of a meeting taking place around a table. On the wall, there are several sticky notes organized into categories: 'Remember This' (blue), 'Key Point' (yellow), 'Action Step' (orange), and 'Main Idea' (pink). A man in a suit is pointing at a sticky note. A woman in a purple shirt is writing on a notepad. Other people are visible in the background, some looking at the sticky notes. A list of bullet points is visible on the right side of the image: '• Getting it Done', '• Having a Plan', '• Having a List', '• Having a Map', '• Having a Vision', '• Having a Goal', '• Having a Purpose', '• Having a Mission', '• Having a Vision', '• Having a Goal', '• Having a Purpose', '• Having a Mission', '• Having a Vision'.

Exercise is safe and beneficial when tailored to the individual's body signals and paced appropriately.

Fatigue and pain are signals to guide exercise pacing, not challenges to overcome aggressively.

Progress should be gradual and flexible, with rest as a vital part of recovery and success.

Collaboration with knowledgeable health professionals provides reassurance and supports sustainable exercise.



**Thank you –
any questions?**

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