

Review Article

## Work Related Musculoskeletal Disorders in Physiotherapist; Prevalence and Associated Factors: A Review of Literature

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### ABSTRACT

**Background:** Physiotherapists are known to be prone to Work-related musculoskeletal disorders (WRMDs) due to their varied working set ups like Neurology and rehabilitation, orthopaedics, manipulative/private practices, paediatrics, general hospitals, nursing homes/gerontology which require different postures and position for the treatment of health related conditions which make it difficult to lay guidelines in the profession of physiotherapy.

**Objective:** The objective of this study was to determine the prevalence of work-related musculoskeletal disorders (WRMDs) and associated risk factors in physiotherapists.

**Method:** A thorough literature search was done by using various databases like PUBMED, Science Direct, Springer, Medline, COCHRANE, using different key words mentioned below. The article search was limited in humans, English only if they were published in the last 15 years to fulfill the needs of the study.

**Keywords:** Musculoskeletal disorders, Occupational injury, Physical therapy, Risk factors, Ergonomics; exposure assessment.

### INTRODUCTION

Work related musculoskeletal disorders (WMSDs) are characterized as multifactorial, with physical, psychosocial /organizational, individual and occupational components. Physical therapy practitioners are at a high risk of developing work related musculoskeletal disorders (WMSDs) because they are often involved in physically demanding and intense, repetitive tasks in their practices with age and sex of the therapists as a factor. <sup>[1,2]</sup> Respondents aged more than 50 years had the lowest rate of work-related injuries. The respondents first developed symptoms before the age of 30 years and that more than half of these initial episodes occurred within five years of

graduation. <sup>[2]</sup> Studies of physical therapists have examined injuries, pain, work habits, and the effects of WMSDs on job performance and reported that as many as 32% of physical therapists reported sustaining a work-related injury (WRI) in the past 2 years. <sup>[3]</sup> Most comprehensive study of WMSDs in physical therapists investigated their prevalence in 9 different body areas with highest annual prevalence in low back(45%), followed by wrists, hands with increased vulnerability in the thumb joints<sup>[4]</sup> (29.6%), upper back(28.7%), neck (24.7%), shoulders, elbows, hip and thighs, knees, and ankles and feet (less than 20%). <sup>[5]</sup> Physical therapist is also known to be prone to work stress with common

sources of work stress including excessive workloads (both clinical and administrative) and a lack of resources (equipment, staffing, and time). The professional culture in physical therapy may complicate the work environment.<sup>[6]</sup>

The area of concern raised in literature is the risk factors associated with physical therapists' WMSDs. The set of 17 job related factors, classified into 4 broad areas which contribute to the development of symptoms are as follows:-

- Activities (6 risk factors pertaining to specific activities.)
- Postural factors (4 risk factors relating to the therapist body mechanics that includes body positioning and posture.)
- Work related issues (4 risk factors pertaining to repetitiveness of treatment and appropriate time management. Example; scheduling and rest break.)
- Personal factors (3 risk factors relating to work demand and work capacity of the physical therapist, the therapist state of health and knowledge.)<sup>[5]</sup>

The two aspects of psychosocial work environment that are frequently studied are job demand and job controls. According to job demand and job control model a combination of high demands and low controls increases the risks of poor outcomes. Increased demand, decreased job strains have been associated with a wide variety of outcomes, including turnover and WMSDs.<sup>[6]</sup> the specialty area of practice/job setting is also thought to be a risk factor because of the limited treatment techniques used by practitioners.

Strategies used by therapists to minimize WMSDs include the following: Use of aids and equipments- E.g.: height adjustable beds, lifting belts, side boards, splints, stools with casters. Self protective behaviors which include: Outsourcing - reducing the load imposed on the therapists by employing or using a physical therapy assistant, Preventive strategies - adequate rests and pause, warming up before performing the technique, alteration in the environment (E.g.: bed height) and body

mechanics of the physical therapist, Reactive strategies - include actions undertaken by the physical therapist to aid in avoidance of aggravating factors. (E.g.: using different body parts to administer manual therapy so as to prevent overuse of the involved structures.)<sup>[5]</sup>

## METHODOLOGY

A structured literature search was done using various electronic data base: Pubmed, Springer, Medline, Cochrane, Pedro, APTA, Science Direct. Study design: Literature review. Inclusion criteria: only English articles, Exclusion criteria: Articles of other languages. Out of 30 literatures reviewed 14 were included in the study.

## LITERATURE REVIEW

Musculoskeletal Disorders are considered work-related when the work activities and work conditions significantly contribute to their development or exacerbation but are not the sole determinant of causation (World Health Organization, 1985).<sup>[13]</sup> Musculoskeletal disorders (MSDs) are widespread in many countries, with high costs incurred from long-term disability and its impact on quality of life.

Prevalence in body regions most commonly involved are the low back, neck, shoulder, forearm, and hand, although recently the lower extremity has received more attention. Musculoskeletal disorders may involve the upper or lower extremity and trunk. Patho mechanisms of work-related neck and upper limb musculoskeletal disorders are illustrated in (Armstrong et al., 1993) a model (Fig. 1). This model is useful for describing the cumulative nature of disorders whereby worker activity produces internal forces acting upon body tissue (termed a dose). The dose causes a response by the body such as increased circulation, local muscle fatigue and other various responses of a physiological and biomechanical nature. The response may increase or decrease the ability to cope with further responses. If there is insufficient

time to allow regeneration of body tissue capacity then a series of responses may further reduce the available capacity. This cumulative cycle may continue until some type of structural tissue deformation occurs (e.g. pain, swelling, limited movement.) Others (Van der Beek and Frings-Dresen, 1998; Winkel and Mathiassen, 1994) have produced models that suggest a pathway between capacity and the work activity. A reduction in capacity may result in a reduction in the amount of work performed and this reduction may be sufficient to allow workers capacity to recover. [14]

Musculoskeletal disorders affect muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels by a wide range of inflammatory and degenerative conditions. These include clinical syndromes such as tendon inflammations and related conditions (table:1) (tenosynovitis, epicondylitis, bursitis), nerve compression disorders (carpal tunnel syndrome, sciatica), and osteoarthritis, as well as less well standardized conditions such as myalgia, low back pain and other regional pain syndromes not attributable to known pathology. [11]

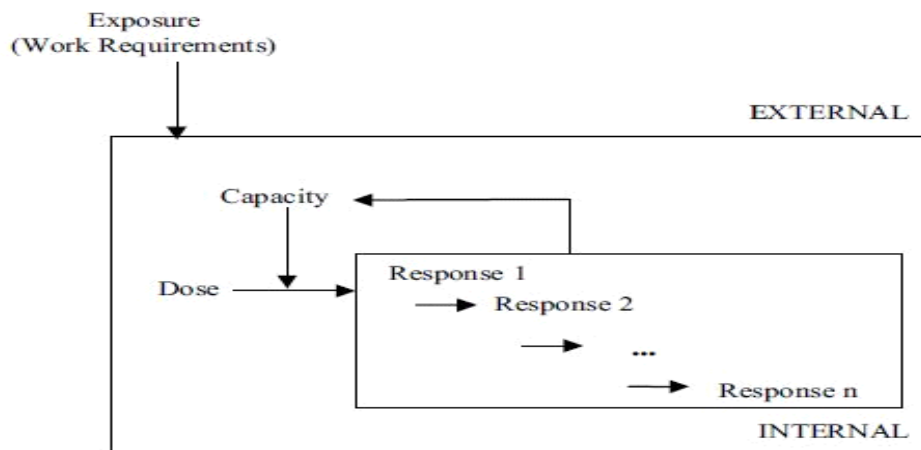


Fig.1: Conceptual model of neck and upper limb musculoskeletal disorders that describe the pathway involved in the pathogenesis of these disorders. [11]

Table 1: Classification of upper limb and neck WRMSDs. [14]

Tendon-related disorders	Nerve-related disorders	Muscle-related disorders	Circulatory/vascular type disorder	Joint-related disorders	Bursa-related disorders
Tendinitis/ peritendinitis/ tenosynovitis/ synovitis	Carpal tunnel syndrome	Tension neck syndrome	Hypothenar hammer syndrome	Osteoarthritis	Bursitis
Epicondylitis	Cubital tunnel syndrome	Muscle sprain	Raynaud's syndrome		
De Quervain's disease	Guyon canal syndrome	Muscle strain			
Dupuytren's contracture	Pronator teres syndrome	Myalgia			
Trigger finger	Radial tunnel syndrome	Myositis			
Ganglion cyst	Thoracic outlet syndrome				
	Cervical syndrome				
	Digital neuritis				

Table 2: Stages of WRMSDs can also be illustrated as given below in (Damany and Bellis, 2001)

Stage 1	Pain during work that eases off as soon as the worker leave the job	Recovery in weeks
Stage 2	Pain that goes home with the worker and interferes with ADL, but disappears by the morning	Recovery in months
Stage 3	Pain that wakes the worker up and stays with him/her all day and night	Recovery in several months

Repetitive strain injury is a widespread illness involving soft tissues of the upper body-nerves, muscles, tendons,

ligaments, and blood vessels. Repetitive strain injury (RSI) is not the only term used. It is also referred to as cumulative trauma

disorders (CTDs) and repetitive motion disorders, occupational overuse syndrome (OOS), work related musculoskeletal disorder (WRMSD), or upper extremity musculoskeletal disorder (UEMSD).<sup>[13]</sup> RSI is a general term used to describe a disorder in which people develop symptoms such as pain, numbness, stiffness, and weakness as a result of sustained repetitive work, often done under adverse conditions. These can range from ordinary daily stress to truly bad work setups and work conditions. Usually the pain or other symptoms affect their work and other normal activities.<sup>[13]</sup> WRMSDs have multiple risk factors, both occupational and non-occupational. In addition to work demands, other aspects of daily life, such as sports and housework, may present physical stresses to the musculoskeletal tissues.

The musculoskeletal and peripheral nerve tissues are affected by systemic diseases such as rheumatoid arthritis, gout, lupus, and diabetes. Risk varies by age, gender, socioeconomic status, and ethnicity. Suspected risk factors include obesity, smoking, muscle strength and other areas of work capacity. Based on both experimental science and epidemiologic investigations risk factors in a job setting vary from that which include rapid work pace and repetitive motion patterns; insufficient recovery time; heavy lifting and forceful manual exertions; non-neutral body postures (either dynamic or static); mechanical pressure concentrations; segmental or whole-body vibration; local or whole-body exposure to cold all grouped under a term known as ergonomic hazards and any of these in combination with each other or with undesirable features of the psychosocial work environment like high demands and low degree of control over one's own work decreases the work capacity of an individual.<sup>[12]</sup>

The prime factors cited include repetitive tasks, high force, direct pressure, and awkward joint and prolonged constrained posture these makes healthcare workers particularly vulnerable to musculoskeletal injury.<sup>[12]</sup> work-related

musculoskeletal disorder (WRMD) is a musculoskeletal injury that results from a work-related event. This may result in lost work time, work restriction, or transfer to another job. These types of injuries are common among physiotherapists. This group has a moderately high prevalence of occupational low-back pain. Physical therapists routinely perform manual therapy, such as soft-tissue mobilization, which means that the upper limb is also exposed to risk factors associated with musculoskeletal and neurovascular disorders. In addition, these professionals routinely perform activities that involve transferring a patient (from exercise mat to chair, to parallel bar etc), assisting with activities on the exercise mat, and lifting and using cumbersome equipment. These work tasks put therapists at risk for both acute and cumulative musculoskeletal pain.<sup>[5]</sup> Although physiotherapists frequently need to use manual handling and awkward postures in the course of their work, there are no profession specific guidelines to assist them in their work. These causes along with the increased prevalence of injuries and disorders sustained by my staff and colleagues inspired me to conduct the study on risk and prevalence of WRMSDs in physical therapists. Musculoskeletal injury in physiotherapists is defined as "any activity requiring the use of force exerted by a person to lift, push, pull, carry or otherwise move, hold or restrain an animate or inanimate object" (Australian Manual Handling Regulations 1999). 91% PT experience WRMSDs during their career with recurrence rates of up to 88% and 80% of PT experience symptoms in at least one body area over a 12 month period.<sup>[5]</sup> PT works in various clinical settings such as Neurology and rehabilitation, Orthopaedics, Manipulative, private practice, Paediatrics, General hospitals, Nursing home/ Gerontology.

Figure 3 shows that the first episode of WMSD occurred for the majority of therapists in the first 5 years of practice and Fig 4 shows the prevalence of symptoms

was not different between male and female therapists in most areas. [5]

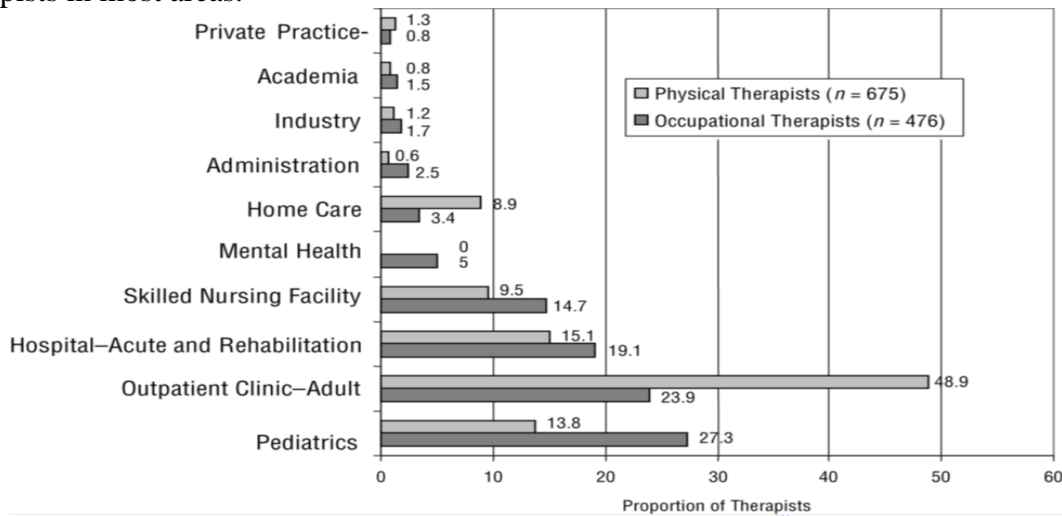


Fig 2: Practice areas by professional affiliation, 2006. [3]

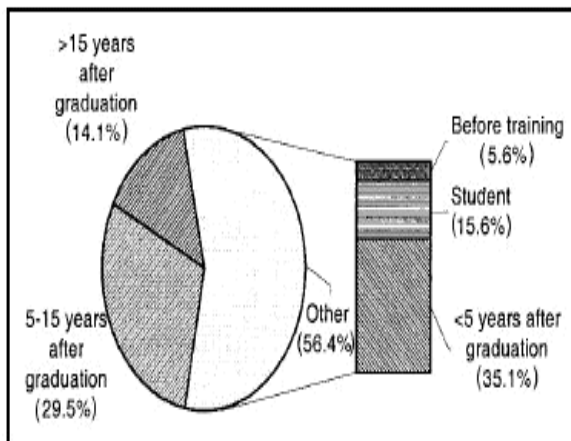


Fig 3: Timing of initial episode of symptoms among therapists who reported ever having WRMSDs (n=488). [5]

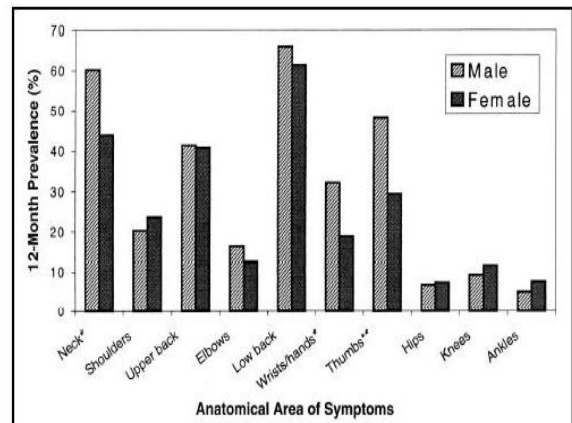


Fig 4: Anatomical area of symptoms with 12-month prevalence in males and females physical therapists. [5]

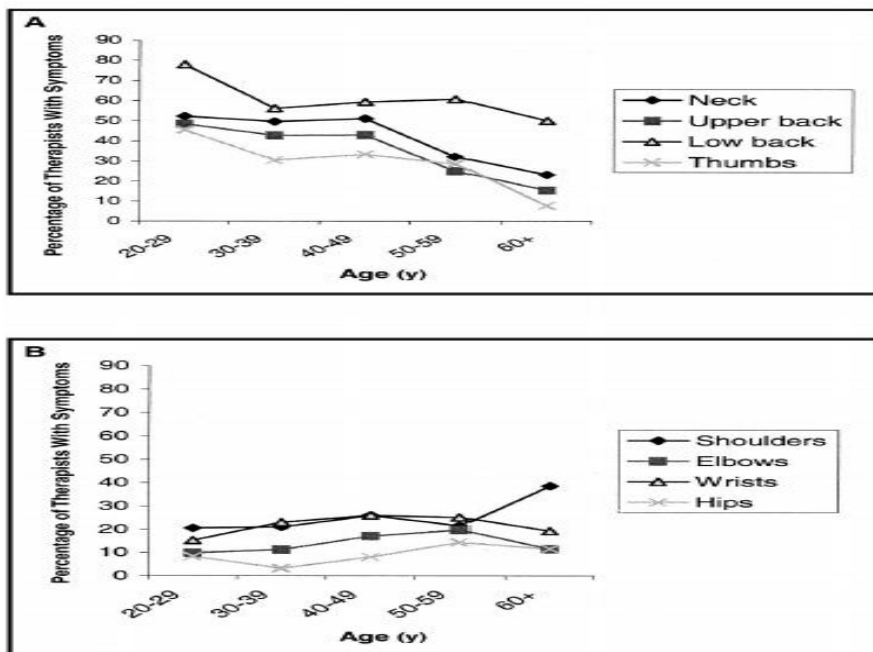


Fig 5: (n=536) (A) Neck, upper back, lower back, thumbs; (B) Shoulder, elbow, wrists, hips.

Prevalence of injury in a particular body area also depends on the age of the therapists (Fig 5)

## RESULTS AND DISCUSSION

There were 30 studies reviewed out of which 14 studies were included in this study. The observation of this study was that therapists changed their specialty area or left the physical therapy profession because of WMSDs. [2,3,9,5] This finding represents unknown personal and financial costs to the therapists, the profession, and the community. Another finding was the relationship between thumb symptoms and the use of mobilization and manipulation techniques. [5] More than 50% of physical therapists reported that they had experienced WMSDs at some time. [2,9,5] WMSDs were related to age, sex, specialty area, and specific tasks. [9,5] On the contrary few studies indicate that the frequency of WMSDs was not gender related (except lower back, neck, and shoulder complaints) nor was it related to age (except lower back complaints), working venues (except hand/wrist), working hours, area of specialty, or exercise. WMSDs impact on work was minor. Lower back and neck WMSDs were related to the participants demographics. Hand/wrists WMSDs were related to work setting. [1] Workload issues were identified as being related to the presence of WMSDs, particularly upper-body symptoms. [2,5] The prevalence of WMSDs is highest in the low back region among physical therapists followed by the upper back, the wrist and hand having the second highest prevalence. [10,2,8,9,3,1,5] These findings may reflect regional differences in how therapists practice. The increased prevalence of symptoms among younger therapists has been attributed to various factors majority being the reluctance of younger therapists to seek assistance with physically demanding tasks and with their inexperience as more than 50% had their first episode as a student or in their first 5 years of practice. [2,9,5] The explanation

proposed by Bork et al, that the higher prevalence of WMSDs among younger therapists was due to survivor bias. Prevalence of WRMDs was significantly higher in female physiotherapists and especially those with lower body mass index this, is contrary to physical therapists in Kuwait. [1,9] The practice areas most frequently left by respondents were neurology and rehabilitation, neither of which demonstrated increased prevalence of low back symptoms in the previous year. [5] This finding suggests survivor bias, where therapists who have low back pain remove themselves from the specialty area. Another suggestion is that older physical therapists are likely to move into less physically demanding work (e.g., administration), which is not supported directly by the data. [5] The finding that male physical therapists had more neck, wrist and hand, and thumb symptoms than did female therapists contrasts with the finding by Bork et al. and a few studies. This increased prevalence of symptoms in male therapists may relate to their greater usage of mobilization and manipulation techniques. [4,5] Females were at a higher risk of osteoarthritis at the carpometacarpal joint compared to the others who performed mobilization and manipulation techniques. The pain experienced at the thumb is of low severity and high frequency. The association between the use of mobilization and manipulation techniques and thumb symptoms suggest simplifications for the way in which therapists practice. [4] High ORs and a dose-response relationship support the notion of cause and effect and imply that there should be some limits placed by therapists on the number of hours for which they use these techniques. [5] Work-related musculoskeletal disorders affected the therapists to varying degrees. [2,5] Low back symptoms were most intrusive, interfering with ADL, leisure activities, and work more often than those in other body areas. [2,5] More than half of all therapists had moderately severe symptoms

and less than half compromised their ADL or leisure activities this, indicates that the issue of musculoskeletal injury within the physical therapy profession is widespread and not without cost. [5]

The only specialty areas of practice related to WMSDs were sports physical therapy, private practice, and pediatrics. The increased prevalence of musculoskeletal symptoms among therapists employed in sports physical therapy and private practice may relate to the type of tasks they perform, rather than the area itself. The higher prevalence of knee symptoms among pediatric physical therapists is presumably due to the large amount of time spent by these therapists in kneeling and crouching. It is likely that risk factors may interact, making identification of the cause of injury difficult. [5] The potential risk factors included increased exposure that is, experience (years), hours worked per week and patient care hours per week, upper-limb, neck, and upper back symptoms were related to mobilization and manipulation techniques and other hands-on treatment suggests that something about the performance of these techniques contributes to symptoms in these areas. [10,2,3,8,5] Lifting dependent patients was related to the development of low back symptoms. [10,2,8,5] Workload issues, relating to the way physical therapists practice, were related to symptoms in the neck, upper back, and upper limbs. [2,5] The prevalence of these symptoms was also higher in therapists who had worked in private practice. [5] It seems that the way physical therapists work is related to their musculoskeletal health, particularly in the area of private practice, where these issues are directly related to the income of the practice. Performing the same task repeatedly was related to the presence of symptoms in many areas and calls into question the wisdom of practicing in such a way. [10,2,8,5] Concepts such as job rotation and variety in work are commonly applied in industry to avoid overloading any particular anatomical area, either by sustained posture or repetitive actions. [2,8,5]

Repeated muscle contractions and static loading are known to be risk factors in the development of cumulative trauma disorders. Kroemer stated that provision of alternating work “which allows breaks in otherwise repetitive or maintained activities” is essential in the prevention of such disorders. [5] Thus, physical therapists should ensure that they vary their techniques in order to place varying stresses on different anatomical areas. [2,9,5] Within specialty areas, therapists need to have at their disposal a variety of treatment tools. This is not only so that the ideal treatment may be given, but also so that they can vary the way in which they use their body, thereby reducing the risk to any one body part. [2,9,5] Thus, therapists with high levels of demands and low levels of control were at increased risk for both turnover and work-related pain and those physical therapists should consider the physical work and psychosocial work environment, along with other factors, when choosing a job. [6,7]

## CONCLUSION

The prevalence of WMSDs varies in the body regions. But, the biomechanical change in the body associated with various activities is not discussed. The dose-response relationship between the number of hours spent performing techniques and the prevalence of symptoms has not previously been documented and suggests that causality is probable. Further study is needed to establish a more precise relationship and to determine what proportion of work time can be safely spent using these types of techniques. Objective criteria for measuring exposure are needed to enable the specific risk factor to be identified. As has been demonstrated by other researchers, knowledge of ergonomics, injury, and treatment does not offer the physical therapist immunity from injury. Further research is needed to identify those aspects of the job and associated work practices contributing to injury, with a view to formulating preventive strategies. Few therapists changed their specialty area or left

the physical therapy profession because of work related musculoskeletal problems. The greatest proportion left neurology and rehabilitation, and those therapists who changed their specialty area entered a variety of specialty areas. Little is known of this group of therapists, and further research is under way to better understand the issues and costs involved in changing specialty area or leaving the profession. The increased prevalence of symptoms among younger physical therapists in particular underlines the need for them to have at their disposal a range of strategies to reduce risks posed by their work and avoid injury. Most importantly, there is a need for further research to identify aspects of physical therapy practice that place therapists at greatest risk and to develop methods of reducing that risk. However, given that therapists self-identified the contributing risk factors, the association may have been due to bias and what therapists believed to be true, rather than the actual contribution this factor made to their injuries. This finding should thus be viewed cautiously until it is independently verified. The range of conditions and type of clients treated, the financial arrangements of the therapist, and the set up of the practice may also influence the development of symptoms. These possibly confounding factors were not considered, and they suggest a focus for further research.

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