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The Effect of Exercise/Physical Activity on Chronic Pain and Pain-Related Mental Health Issues, In Computer Workers with Repetitive Strain Injuries

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The Effect of Exercise/Physical Activity on Chronic Pain and Pain-Related Mental Health Issues, In Computer Workers with Repetitive Strain Injuries

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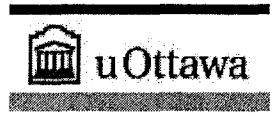

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The researcher at Wilno, ON (2007) at a stone memorial dedicate "to the workers whose lives have been disabled or ended by injury or disease in the workplace."

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Acknowledgments

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Abstract

This study focuses on computer workers with repetitive strain injury (RSI) that lead to chronic pain, interference with daily activities (work and leisure), getting a night's sleep, and pain-related mental health issues (e.g., anxiety and depression). People take their hands for granted, and when they suddenly lose the use of them and are unable to perform basic daily activities (bathing, dressing, feeding ourselves), may develop anxiety and depression.

This research examines how physical pain caused by RSI affects computer workers as a whole, and how workers use exercise/physical activity participation and health professionals use exercise/physical activity prescription to alleviate the accompanying pain, anxiety and depression. Interviews were conducted with eight RSI-injured computer workers from the public service and eight health professionals who treat this type of injury. The results show that regular exercise/physical activity is seen to be a weapon in combating pain and pain-related mental health issues in RSI-injured computer workers.

An improved understanding of the benefits of exercise/physical activity for RSI-injured computer workers living with chronic pain and pain-related mental health issues will provide them with more effective coping strategies, ameliorate their emotional/psychological recovery, facilitate their active return to the workforce, and enhance their overall quality of life.

Introduction

Context of the Study

The media and academic literature present information on the subject of road and sport injuries, however not much is said with reference to work injuries. If work injuries in general and repetitive strain injuries in particular are not as broadly reported it should not be assumed that they do not occur. All are vulnerable to injury in the workplace. It is important to understand and address workplace injuries. This study will demonstrate that they do not only impact on the physical health of the injured workers but they also impact on their psychological health. Workplace injuries can happen to anyone, consequently when examining them, the physical as well as the psychological aspect of work injuries must be taken into consideration. In doing this it is hoped that the injured workers will be able to return to work and re-integrate into the community more quickly.

In Canada, more than 900 workers died in 2004 of work-related injury or disease. More than 300,000 were ill or injured seriously enough to miss work (Association of Workers' Compensation Boards of Canada, 2005). The 28th of April was declared the International Day of Mourning for workers killed as a result of work injuries. In Ottawa annual ceremonies are held in Vincent Massey Park around a stone memorial dedicated to fallen workers. Workers sustain injuries in both blue and white collar work. However, this study will focus on white collar work related injuries, specifically Repetitive Strain Injuries (RSIs). This term will be explained later in the Definitions sections.

With the increased use of computers in the workplace, more and more workers are developing RSIs. In 2003, Statistics Canada reported that RSIs affected an estimated 2.3 million adult Canadians (1 in 10). In 2004, RSIs accounted for more than 50% of all

injuries reported to the Ontario Workplace Safety and Insurance Board (WSIB) (Laurentian University, 2004; Murphy et al. 2006). According to three unions, Public Service Alliance of Canada (PSAC, 2003), Canadian Union of Public Employees (CUPE, 2003), and Professional Institute of Public Service of Canada (PIPSC, 2003) and a Health Canada Occupational Health Therapist (Frantz-Hubert Sully, 2005), the number of public service employees with RSIs is increasing. Despite the high incidence of RSIs, the WSIB does not list them in its Worker's Report of Injury (amended in November 2005). However, the Employer's Report of Injury (also amended in November 2005) provides two categories where they can be identified -- "Repetition" and "Overexertion" (WSIB, 2005, Employer's Report of Injury, Type of accident/illness).

The 28th of February was declared the International RSI Awareness Day and injured workers, union representatives, health and safety professionals, and health care practitioners mark it annually. Across Ontario in 2006 the participants in these events again called for an ergonomic regulation similar to legislation passed in British Columbia. Since passing ergonomic legislation in 1998, BC registered a 19% drop in RSIs and a 40% reduction in money spent in RSIs lost time claims. Saskatchewan has implemented a less comprehensive ergonomic regulation. "At Federal level, amendment to Part II of Canada Labor Code, provide explicit statutory authority to develop an ergonomic legislation" (Workers Health & Safety Center, 2006, π last). The importance of RSIs was also recognized by the Mayor of Ottawa Bob Chiarelli who put forward a Proclamation on RSI Awareness Day on 28 February 2006. The proclamation is attached in Appendix A.

Purpose of the Study

The purpose of this study is to gain a better understanding of repetitive strain injuries (RSIs) and explore a broader approach to help RSI-injured computer workers live with chronic pain and pain-related mental health issues. The National Institute of Neurological Disorders and Stroke (2006) states that "Today, pain has become the universal disorder, a serious and costly public health issue, and a challenge for family, friends, and health care providers who must give support to the individual suffering from the physical as well as the emotional consequences of pain" (Introduction, π 3). The results of this study are intended to help injured workers gain insight into their condition and ways of addressing it, as well as help health professionals in treating both the physical and mental aspects of RSIs. This may also reduce time lost due to injuries, and thereby help employees, employers, and insurance companies.

In addition, the present study attempts to fill the gaps in the literature on white collar work related injuries in the public service. It will examine the manner in which physical pain as a result of physical injuries sustained in the workplace affects individuals as a whole leading to the development of psychological injuries such as anxiety and depression. Furthermore, it will look at how exercise/physical activity helps alleviate chronic pain, anxiety and depression. It is acknowledged that there is an impact of individual differences (e.g. age, gender, body/muscle size (women have smaller body/muscles), culture (some cultures are more expressive), income (cannot afford to resign), health status (an already existing health problem) on work injuries, chronic pain and pain related mental health issues.

Research Questions

This study has one general research question and two specific research questions. The general research question is: How does RSI affect the lives of computer workers and what they do to alleviate its symptoms? The first specific research question is: How does exercise/physical activity participation help RSI-injured computer workers live with chronic pain and pain-related mental health issues? The second specific research question is: How is exercise/physical activity prescription used by health professionals to help RSI-injured computer workers live with chronic pain and pain-related mental health issues?

Answers to these questions were sought not only from RSI-injured computer workers but also from health professionals who treat this type of injury. In this way, the research looks at how exercise participation and exercise prescription were used holistically as an alternative and/or adjuvant treatment regimen to help computer workers live with chronic pain and pain-related mental health issues (anxiety and depression)?

Significance of the Study

In order to pick a sample that is accessible for face-to-face interviews, with a limited budget, this study will be conducted on workers using computers in the National Capital Region. The sample will be drawn from a range of occupational groups that includes data entry clerks, computer support staff, research analysts, and managers. These workers perform similar tasks (keying/typing) using similar technology (computer keyboard) in similar work environments (office work). These conditions will lead to similar musculoskeletal injuries (wrist, forearm, elbow, shoulder, neck). Since these occupational groups are well represented in the public service, face-to-face interviews with public

service employees will be conducted. In addition, face-to-face interviews with health professionals who treat RSI will be conducted.

By focusing on RSIs, this study will help fill gaps in information on white collar work-related injuries in the public service along with their consequences. It will meet the needs of the public service for the reason that within the public service, a number of different departments and agencies are tasked with the prevention, evaluation and treatment of work injuries. They include:

- Human Resource and Social Development Canada (HRSDC): responsible for legislation and regulations governing occupational health and safety for workplaces under federal jurisdiction, and for the administration of the Government Employees' Compensation Act.
- Treasury Board: responsible for policies on occupational health and safety, and workers' compensation for public service workers, and provided confidential assistance or short-term counseling to workers experiencing personal or work-related problems through Employment Assistance Program (EAP).
- Health Canada: Its Workplace Health & Public Safety Programme conducts medical and ergonomic assessments of persons suffering from work injuries, and delivers injury prevention sessions.[1]
- Statistics Canada: collects and disseminates data on workplace injuries, especially within the Occupational and Environment Health Research Section.

[1] According to a Health Canada occupational health therapist (Frantz-Hubert Sully), there has been a steady increase in the number of public service employees requesting ergonomic workstation assessments. During the 2004-05 fiscal year, Health Canada received 2,371 requests for ergonomic workstation assessments and gave 538 sessions on injury prevention.

This study will focus on workers who have sustained an RSI that have led to chronic pain, physical limitation, mental health issues and disability. While some of these workers will have difficulties for a limited period of time, others will experience them for months, years or even the remainder of their life. Those who live with long-term pain and disabilities are often unable to work, and suffer from financial difficulties, social isolation, anxiety and depression. For these reasons, Dr. Shain, in consultation with Health Canada, developed the document "Best Advice on Stress Risk Management in the Workplace" in 2000. The purpose of this document was "to raising awareness and inspire action concerning the very real risk to health and safety posed by certain kinds of toxic stress in the workplace" (Shain, 2000, Forward, π 2). In June 2005, the Ottawa City Hall introduced the "Mayor's Initiative on Health and Productive Workplace." This is a coalition of government and business organization that hopes to mobilize community leaders to deal with stress, depression, and anxiety in the workplace. Writing about the workplace stress and mental illness problems, Gray (2005) reports that Mayor Chiarelli said "We are losing the battle, not wining it" (p. F3). Moreover, Ivan Fellegi, the chief statistician at Statistics Canada, "called on employers to take mental health problems seriously" (Gray, 2005, p. F3). Additionally, Galt (2006) reports that "In a novel initiative aimed at safeguarding the mental health of employees, managers and staff at Ontario's Workplace Safety and Insurance Board (WSIB) have jointly formed a committee to monitor workloads" (p. C9).

Thus, the "invisible disability" of anxiety and depression occurring in the workplace has a high cost across Canada (Galt, 2006, p. C9). For instance:

- 35 million number of workdays lost each year due to mental health conditions

- 30-40% of Canadian employees who suffer from some sort of mental condition in any given year
- 35$ billion estimated annual productivity loss resulting from mental health problems
- 85% of new jobs that require mental rather than manual skills

The "invisible disability" of RSIs occurring in the workplace as well has a high cost across Ontario. For example:

- 1996-2004 there were "nearly 27 million lost-time days" (Ontario Ministry of Labor, 2006, Why should you be concerned, π 3)
- An "estimated [loss] at $26 billion dollars a year" (Workers Health & Safety Centre, 2006, Who pays, π 1).
- In 2004, RSIs accounted for more than 50% of all injuries reported to the Ontario Workplace Safety and Insurance Board (WSIB) (Laurentian University, 2004; Murphy, et al. 2006).

Given the high cost of workplace injuries and the large number of Canadians who suffer from workplace injuries, there is a need to gain knowledge and address this type of injuries. Furthermore, there is a need to help the injured workers. As a result, Statistics Canada (2006, Occupational and environmental health studies, π last) argues that,

> Occupational health is an important strategy to ensure the health of workers. The workplace has been established as one of the priority settings for public health action into the 21st century by the World Health Organisation, as it directly influences the physical, mental, economic and social well-being of workers and in turn the health of their families, communities and society.

Accordingly, it is noteworthy to understand how RSI impact on the injured workers physically as well as mentally in order to provide them with adequate treatment options.

In closing, what is new about this study is the fact that the specific literature on RSIs, as we will notice later on in the literature review, does not make a strong reference to the use of exercise for treating pain related mental health issues as is done in the general literature on chronic pain. Therefore, this study proposes a holistic approach to understanding and addressing RSIs, as well as the use of exercise/ physical activity to help computer workers with RSIs live with chronic pain and pain-related mental health issues, such as anxiety and depression. This study will demonstrate that work injuries do not only have an impact on the physical health of the injured workers but they also have an impact on their mental health. Since workplace injuries can happen to anyone, it is important to understand and address workplace injuries such as RSIs. Consequently, when examining them, the physical as well as the mental aspect of the work injuries must be taken into consideration. In doing this it is hoped that the injured worker will be able to return to work and re-integrate into the community more quickly. The results of this study are intended to help injured workers gain insight into their condition and ways of addressing it, as well as help health professionals in treating both the physical and mental aspects of RSIs.

Definitions

In order to understand RSIs, chronic pain and pain-related mental health issues, it is necessary to define these terms along with the terms occupational disabling injuries and rehabilitation.

Repetitive strain injuries are also known as overuse injuries or musculoskeletal disorders and they are incorporated in the list of occupational diseases. They are a family of injuries affecting tendons, tendon sheaths, muscles, nerves and joints (Canadian Centre for Occupational Health and Safety, 2002; Canadian Physiotherapy Association, 2003; Canadian Union of Public Employees, 2003; Murpy et al. 2006; Public Service Alliance of Canada, 2003; Quilter, 1998; RSI Association, nd; Statistics Canada, 2003; Workers Health & Safety Center, 2006). The list of common RSIs includes: tendonitis, Carpal Tunnel Syndrome, epicondylitis, bursitis, tension neck syndrome, thoracic outlet syndrome, and radial nerve entrapment (The Arthritis Society, 2005; Canadian Centre for Occupational Health and Safety, 2002; Canadian Union of Public Employees, 2003; Mayo Clinic, 2006; Murphy et al. 2006; Ontario Ministry of Labor, 2006; Public Service Alliance of Canada, 2003; Quilter, 1998; RSI Association, nd; Statistics Canada, 2003; Workers Health & Safety Center, 2006).

Common symptoms include: numbness, tingling, dull ache to severe pain, clumsiness, muscle wasting, and, especially in the hands, loss of strength and agility, and loss of sensation. If the causes are not eliminated (repetitive rapid movements of a body part such as repetitive finger movements without rest on a keyboard or mouse) or the worker is not moved from the job immediately, the damage can be permanent and irreversible (Canadian Union of Public Employees, 2003; Murphy et al. 2006; National Institute of Neurological Disorders and Stroke, 2004; Quilter, 1998). RSIs will cause a wide range of related medical conditions running from the entire hand, wrist, forearm, elbow, shoulder and neck.

The Merck Manual of Medical Information (2004) indicates that "*pain* due to injury begins at special pain receptors scattered throughout the body" (pp.402-403). According to Beth Israel Medical Center, Department of Pain Medicine and Palliative Care (2005, Glossary) "pain is complex and differs from person to person." There are two basic types of pain, acute and chronic.

According to The Merck Manual of Medical Information (2004) "*anxiety* is a normal response to a threat or to psychological stress and is experienced occasionally by everyone" (p. 549). Woodman and Hardy (2001) indicated that anxiety has two components: cognitive anxiety or worry (how often does one worry) and a somatic anxiety or physiological arousal (how tight one's muscles are). Ramage-Morin (2004) from Statistics Canada reported that in 2002 1.5% of the population suffered from anxiety disorders, and 2.1% had past history of anxiety. The average age of the onset was 25 years old.

The Merck Manual of Medical Information defines *depression* (2004) as "a feeling of intense sadness" (p. 558). World Health Organization (2006) argues that depression is among the leading causes of disability worldwide affecting 121 millions people worldwide. In Canada, in 2000-01, 7.1% of the population aged 12 or older had experienced major symptoms of depression (Statistics Canada, 2005). There are two major types of depression, clinical (chemical imbalance of neurotransmitters in the brain) and reactive also called adjustment disorder (reaction to a traumatic life event e.g. personal injury, death, job loss, divorce) (Psychology Information Online, 2004; Mayo Clinic, 2006).

Injuries can take place on the road, during recreational activities, at home, and/or at work. Work related injuries can be minor, disabling, or deadly. According to Human Resources and Social Development Canada (HRSDC, 2004, Definitions and Glossary, π 1), a *disabling injury* is any occupational injury that:

(a) prevents an employee from reporting for work or from effectively performing all the duties connected with the employee's regular work on any day subsequent to the day on which the occupational injury occurred, whether or not that subsequent day is a working day for that employee;

(b) results in the loss by an employee of a body member or a part thereof or in a complete loss of the usefulness of a body member or part thereof; or

(c) results in the permanent impairment of a body function of an employee.

The Beth Israel Medical Center, Department of Pain Medicine and Palliative Care (2005, Glossary), argues that *rehabilitation* is "treatment for an injury, illness, or pain with the goal of restoring functioning." In light of this definition rehabilitation through *exercise/physical activity* proposed in this study can restore the functioning of RSI-injured computer workers.

The next section will reveal the theoretical framework used in the present study. This framework is based on in the following three approaches: complexity, yin-yang, and postmodernism.

Theoretical Framework

According to Miles and Huberman (1994) "Frameworks can be rudimentary or elaborate, theory-driven or commonsensical, descriptive or causal" (p. 18). Furthermore, they help "lay out your own orienting frame and then map onto it the variables and relationships

from the literature available, to see where the overlaps, contradicts, refinements, and qualifications are" (p. 22). In addition, Neuman (2003) argues that "frameworks are orientations or sweeping ways of looking at the social world. They provide collections of assumptions, concepts, and forms of explanations" (p. 62). Rubin and Rubin (2005) clarify that "A theory links concepts and themes into an overarching explanation that not only addresses the immediate research question but also creates broader understandings about important societal issues" (p. 230).

The present study attempts to examine the manner in which physical pain as a result of physical injuries sustained in the workplace affects individuals as a whole leading to the development of psychological injuries, such as anxiety and depression. In addition, this study proposes the use of exercise/physical activity as a more holistic approach to help RSI-injured computer workers live with chronic pain and pain-related mental health issues. According to Neuman (2003, p. 62) "Theories within the same framework share assumptions and major concepts." In this light, the theoretical framework for this study is derived from the following three approaches: complexity, yin-yang, and the postmodernism paradigm. They are particularly appropriate for this study as well as complementary. The Postmodernism paradigm is needed most directly to justify the study's methodological orientation. The richness of these orientations is helping understand RSIs. Their use will provide insight and guidance into the research question of this study.

Complexity Theory

The twenty-first century needs new ways of viewing our complex world. According to Sanders and McCabe (2003),

> The challenges of the 21st century will require new ways of thinking about and understanding the complex, interconnected and rapidly changing world in which we live and work. And the new field of complexity science is providing the insights we need to push our thinking in new directions [...] complexity science is truly an interdisciplinary science. (Executive summary, π 1)

In addition, Laugharne and Laugharne (2002), and Sanders and McCabe (2003) point out that recently complexity theory is gaining acknowledgement. Laugharne and Laugharne (2002) write that there is a,

> [...] growing acceptance of the unpredictability of non-linear systems through the development of chaos and complexity theories. The recognition of such complex systems has impacted many disciplines from economics to meteorology to medicine. (Postnormal science, π 2)

Byrne (1997), McMurtry (2004), and Sanders and McCabe (2003) emphasize as well the new holistic dynamic and non-linear interactions among the elements of the complex systems rather than the old static, linear and reductionist. According to Sanders and McCabe (2003) complexity theory allows us "to explore the underlying principles, structure and dynamics of complex physical, biological and social systems" (Executive summary, π 2). Furthermore, Byrne (1997) suggests that "'Complexity' is a fundamental challenge to the traditional [...] science as a whole and its ideas of certainty and randomness" (π 1).

McMurtry (2004) gives examples of complex systems, they are "living cells, the human brain, languages, cities and ecosystems" (Complex system, π 2). Sanders and McCabe (2003) provide as well examples of complex systems, such as "a rain forest, a

business, a society, your immune system, the World Wide Web and the rapidly globalizing world economy – where the components are strongly interrelated, self-organized and dynamic" (Complexity science overview, π 3).

Different authors hold theories that humans, from a biological and sociological point of view, are complex systems. Thus, in order to explain how chronic pain leads to pain-related mental health issues, such as anxiety and depression, the complexity theory will be used as part of the theoretical framework of this research project. Accordingly, Rubin and Rubin (2005) argue that:

> Qualitative analysis is not about mere counting or providing numeric summaries. Instead, the objective is to discover variation, portray shades of meaning, and examine complexity. The goals of the analysis are to reflect the complexity of human interaction by portraying it in the words of the interviewees and through actual events and to make that complexity understandable to others. (p. 202)

Later on in the Methodology section several explanations will be given to why qualitative analysis was chosen as the preferred option for this study. One of these explanations is the fact that qualitative methods are used to study our complex world.

The Collins Dictionary of Sociology (2005) presents three assumptions and three arguments with respect to the complexity theory. They are:

> [...] complexity theory challenges three important assumptions in conventional science: that simple systems behave in simple ways, that complex systems have complex causes and that different systems behave differently. Complexity instead makes three arguments: that simple systems can behave in complex ways, that

> complex systems can have simple causes and that different systems can be driven by the same principles and behave similarly. (p. 102)

In addition, Wilson et al. (2001) state that "Biological and social systems are inherently complex, so it is hardly surprising that few if any human illnesses can be said to have a single 'cause' or 'cure'" (π 1). Furthermore, Vasudevan (1997) writes:

> Pain that commonly follows injury or illness can impair physical, psychological, social, and vocational functions. The International Association for the Study of Pain has emphasized the need for multidisciplinary management of patients with chronic pain and for attention to the physical, psychological, social, vocational, recreational, and other functional aspects of persons with pain-related disability. (π 1)

According to Deardroff (2004) "Treatment of depression associated with chronic pain requires a specialized approach. It is generally accepted that the pain and the depression should be treated simultaneously in a multidisciplinary fashion" (Treating depression, π last). Sanders and McCabe (2003) state that "Complexity is truly an interdisciplinary science" (Complexity science overview, π 4). Similarly, Wilson et al. (2001) write that "Complexity science suggests an alternative model – that illness (and health) result from complex, dynamic, and unique interactions between different components of the overall system" (Conclusion, π 2). Moreover, Wörz (2003) holds that,

> Pain is a cognitive, sensory, and emotional experience and a motivational and interactional force. For many patients with pain and depression the complexity theory (Table 3) may be a more appropriate conceptual framework. (Causal relationships, π last)

Wörz's (2003) Table 3 Simple versus complex pain states is reproduced below (Table 1 in this study). This table shows two ideal types (simple and complex) acting as two extremes of a continuum. However, most individuals are in between these two types.

Table 1

Simple versus complex pain states (Wörz, 2003, Causal relationships, π last)

Table 3

Simple versus complex pain states

Simple	Complex
Monocausal	Multifactorial
Unidirectional	Bidirectional
Stimulus-response	Interactions
Linear	Nonlinear
Causal sequence	Network
Deterministic	Nondeterministic

In brief, the complexity theory explains that humans are complex systems and that illnesses have more than one cause or cure; it gives attention to the whole system with its components interacting rather than focusing on partial components; and it puts forward a multidisciplinary holistic approach to treat health issues, for example physical injuries leading to psychological injuries.

Yin-Yang Theory

Yin-Yang theory is the second theoretical approach used in this study's theoretical framework. Balch and Balch (2000) write that,

> Traditional Chinese medicine (TCM) is an ancient form of medicine. It is based mainly on the prevention of illness, although it has helped many people to find a cure for wide variety of health problems [...] The key to understanding Chinese medicine is to understand the idea of balance [...] Once balance is attained, the person regains health [...] For centuries the Chinese have taught how to achieve balance in life using the concept of yin and yang, which are present in human beings and in all of nature. (pp. 701-702)

In addition, Clydesdale (2005) suggests that "The concept of Yin and Yang is a constant interaction and rebalancing process of two opposites. Simple, neither too much of something (excess) nor too little of something (deficiency) is good. An ever present re-balancing is necessary for optimal health" (Constitution vs. lifestyle, π 3).

According to Lu (2004) Yin-Yang theory is one of the Eastern philosophies that "interprets the law of the unity of Yin-Yang and elaborates things' origin, development, and disappearance" (Yin-Yang theory, π 1). Lu (2004) writes "that Yin and Yang exist in everything in the world" (Yin-Yang theory, π 3). Furthermore, he explains that,

> Everything in the world can be described, explained, and further divided into the Yin-Yang characteristics as illustrated by the interdependent dialectics such as black-white, moon-sun, mind-body, stillness-movement, coldness-warmth, inward-outward, downward-upward, backward-forward, closeness-openness, dysfunction-function [...] female-male. (Yin-Yang theory, π 3)

Lu (2004) notes that "There are four fundamentals in Yin-Yang theory" (Yin-Yang theory, π 6-9). They are listed below:

- Opposition, for instance the two opposite sides of Yin-Yang, exist in everything in the world, such as heaven-earth, hot-cold, fire-water, male-female; furthermore "the disruption of the relationship between Yin and Yang results in diseases or death."
- Interdependence, for example Yin cannot exist without Yang and vice versa. In Chinese culture, such a relationship is called "co-root." "Yin and Yang are rooted in each other to nourish, assist, and benefit each other. The co-existence of Yin and Yang brings their function into full play."
- Growth and decline, namely Yin and Yang continually change as "growth and decline or increase and decrease." There are four main types of alterations:

i. A (either Yin or Yang) increases while B (either Yang or Yin) decrease (e.g., from winter to summer in terms of the seasons)
ii. A decreases while B increases (e.g., from summer to winter)
iii. A increases while B increases e.g., the growth of children in both Yin and Yang)
iv. A decreases while B decreases (e.g., dying people)

Lu (2004) points out that "it would be normal for the alternation to stay within certain limits. Otherwise, the pathological state of imbalances Yin – Yang occurs."

- Transformation, such as Yin can transform into Yang and vice versa. "The growth and decline of Yin-Yang serves as the condition and stage of transformation of Yin-Yang whereas the transformation of Yin-Yang is the result of the growth and decline of Yin-Yang."

Lu (2004) suggests that we [Westerners] should not see Yin-Yang only as opposites and should not separate them because,

> As long as we separate this 'oneness' into two, we will miss the fundamental meaning in Eastern culture. All things have their complementary part. It is only in the human mind and perception that things are separated into opposite per se [...] The 'oneness' of Yin-Yang is necessary in life. (Yin-Yang theory, π 10)

According to Lu (2004) this ancient Chinese philosophy helps us understand "nature and life" (Yin-Yang theory, π 10). Lu (2004) argues that this philosophy as well explains "the law of change in nature and the law of the unity of opposites" (Yin-Yang theory, π 10).

In brief, the Yin-Yang theory shares a number of believes with the complexity theory and postmodernism. For instance, Yin-Yang theory focuses on the whole system (Yin and Yang) with its two components interacting rather than focusing on its opposite components Yin or Yang. The Yin-Yang theory gives attention to the balanced interdependence between the pair Yin-Yang (such as body-mind, health-illness) and emphasizes the importance of their mutual complementary influences, for example the interdependence and influence among pain, anxiety, depression, and more pain.

Postmodernism

The Postmodernism paradigm contributes to the study's theoretical framework and methodological approach. Neuman (2003) argues that postmodernism started "in the humanities and has roots in the philosophies of existentialism, nihilism, and anarchism and in the ideas of Heidegger, Nietzsche, Sartre, and Wittgenstein" (p. 89). According to Laugharne and Laugharne (2002) "one clear pattern to postmodern thought is in its reaction to and rejection of certain aspects of the philosophy underlying modernism"

(Postmodernism, π 1). Postmodernists "reject modernist claims [...] of certainty" (McMurtry, 2004, Postmodernism, π 1), and the truth and objectivity, thus for them "Quality, not truth, becomes the goal" (Laugharne & Laugharne, 2002, Postnormal science, π 4).

Researchers working within the postmodernism paradigm are divided, for instance some "assume that reality is not fully knowable and the truth is impossible to define" yet others "worry that nothing at all can be known and claim that the best that can be accomplished is for researchers to allow people to share experiences and feelings with one another" (Rubin and Rubin, 2005, p. 27). Postmodernists recognize that "knowledge is situational and contextual", and argue that "neutrality is impossible because everyone has interests and attitudes that influence how topics are selected" (Rubin and Rubin, 2005, p. 27). According to Rubin and Rubin (2005) some postmodernists believe that in a written report the "author's voice is not privileged" and "that only the interviewees' voices should be presented through unedited videotapes or transcripts" (p. 27). Furthermore, Neuman (2003) holds that the reason for research is "To express the subjective self" (p. 91). This approach will be reflected in the study's methodological orientation.

In the Collins Dictionary of Sociology (2005) it is written that postmodernism has two sides. The hopeful and less hopeful sides are presented below:

> [...] which should be disentangled: a 'hopeful' side, compatible with a 'continuation rationality' and progress [...] and a 'less hopeful' side with no hope of avoiding licence and disorder. The hopeful side opposes dogmatic versions of rationality and can bring respect for different traditions while increasing the scope

> for individual self-fulfillment and creativity. The less hopeful side might seem to support the potential for relativism and resurgence of intolerance. (p. 479)

According to Slife (1998) there are three postmodern assumptions. They are: lived experience, radical holism and contextuality. With respect to the lived experience, Slife (1998) points out that,

> Instead of focusing on an observable, material reality that is considered to be behind the changing nature of experience, many postmodernists argue for a focus on experience itself [...] because our lived experience offers far more than what comes through our senses, including our feelings, mental events, and even spiritual occurrences. (pp. 216-217)

In the Methodology section further reasons beyond postmodernism inspiration will be given as to why qualitative analysis was chosen as the preferred option for this study. Namely, the real-life experience of the computer workers living with RSIs and of the health professionals treating the RSIs.

When talking about radical holism, Slife (1998) argues that "the postmodernist asks us to consider that the parts depend upon the whole for existence. In this sense, the whole of experience, including the past, present, and future, is required to understand any portion of experience" (p. 217). According to Slife (1998) "the postmodernist advocates searching for experiential patterns" (p. 217). These patterns "are culturally and contextually bound. That is, they pertain to and must be understood within the context in which they are found" as well "are never considered final or complete because they are constantly evolving as our contexts change and the interpreters of such regularities evolve" (Slife, 1998, p. 217). The postmodern assumptions of lived experience, holism

and contextuality explained above are linked to complexity theory presented earlier and yin-yang theory that will be presented shortly.

McMurtry (2004) states that,

> Postmodernism has come to stand for a set of critical discourses that seek to uncover how identity, culture, and knowledge shape and are shaped by issues of language, representation and power [...] Complexity science accepts postmodern insight about the relational nature of knowledge, truth and identity. However, complexitivists argue that such questions are not just a matter of human, intersubjective negotiation – they are also a function of the mutually affective relationships among all phenomena. Complexity thus opens onto the more-than-human world. (Postmodernist, π 2-3)

In short, postmodernism shares a number of views with complexity theory. Postmodernists focus on the whole system (past, present and future experience) with its parts interacting and depending on the whole for their existence. For instance, when looking at pain one needs to look as well at pain-related mental health issues, such as anxiety and depression. Postmodernist researchers give attention to the shared lived experience and use methodologies that emphasize the importance of the interviewee's voice, for instance the injured workers and health professionals.

As seen above, this study's theoretical framework brings together complexity and Yin-Yang theories along with a postmodernist approach. These theories allow an approach to work injuries from a unique perspective, in that it perceives the human body as being made of components, yet fundamentally connected and balanced. Furthermore, these components are mutually interacting and complementing each other, thus these

components cannot be treated in isolation, such as RSIs, pain, anxiety, and depression. This theoretical framework will enable an understanding of the physical as well as psychological aspect of pain, consequently, it will provide new insight into the treatment of pain and pain-related mental health issues. As Wilson et al. (2001) indicate:

> [...] neither illness nor human behavior is predictable and neither can safely be 'modelled' in a simple cause and effect system. The human body is not a machine and its malfunctioning cannot be adequately analyzed by breaking the system down into its component parts and considering each in isolation. (Complexity science, π 3)

Accordingly, this framework allows the research to propose a holistic approach to understanding and addressing RSIs as they impact on the physical and mental health of the injured workers, as well as to using exercise/physical activity to help RSI-injured computer workers live with chronic pain and pain-related mental health issues. Wilson et al. (2001) hold that "Health can only be maintained (or re-established) through a holistic approach" (Summary points, π 3). In the final analysis, complexity, Yin-Yang and postmodernism are appropriate approaches for the conceptual framework to be used in this study for patients living with pain, anxiety and depression.

The next section will begin with a brief review of legal matters and health privacy legislation on work injuries. This will be followed by a general discussion of pain and a specific discussion of RSIs. The section will end with treatment options that are administered simultaneously for pain, anxiety, and depression, such as medication, the gate control method, and exercise/physical activity.

Literature Review

Legal Matters and Health Privacy Legislation

Legal matters and health privacy legislation related to work injuries do not comprise the main focus of this study. However, it is pertinent to have an appreciation of legal rights and responsibilities of employers and employees in the case of injury. This section will give a brief overview for the RSIs work risk factors (physical and organizational), costs (human and economic), laws regulating work injuries (WSIB Act, Occupational Health and Safety Act , Labor Code, and Criminal Code), and federal and provincial health privacy laws.

The Canadian Center for Occupational Health and Safety (1999) and Murphy et al. (2006) argue that RSIs are caused by "repetitive work, inappropriate demands on muscles and tendons" (Canadian Center for Occupational Health and Safety, 1999, How can tennis elbow be prevented, π 4), as well as work "without rest and time for the tissue to heal" (How does tennis elbow occur, π 5). Occupational Health Clinics for Ontario Workers (2005) maintain that when this happen it "leads to a work related musculoskeletal disorder (WMSDs) [...] sometimes called repetitive strain injuries (RSIs), cumulative trauma disorders and overuse injuries" (What are work related WMSDs, π 1). The Arthritis Society (2005) reveals that "The incidence of repetitive stress injury is becoming more widespread as many jobs now require people to make repetitive actions such as typing or clicking a computer mouse" (How common is RSI, π 2).

The Institute for Work and Health (nd) identified two risks factors:

- "physical risk factors" such as "substantial amounts of time spent working at a computer."
- "workplace organizational risk factors" such as "prolonged periods of work without adequate breaks; [...] tight deadlines; excessive workload; monotonous work; low job control; lack of input into decisions about how work and workstations are designed; [...] job insecurity or dissatisfaction; and poor workplace social support" (π 2-3)

The RSIs not only have a human cost as mentioned earlier for instance pain and pain-related mental health issues, but also an economic cost. For example from 1996-2004, in Ontario there were "nearly 27 million lost-time days" (Ontario Ministry of Labor, 2006, Why should you be concerned, π 3) and an "estimated at $26 billion dollars a year" (Workers Health & Safety Centre, 2006, Who pays, π 1). Accordingly, it is noteworthy to understand how RSI impact on the injured worker physically as well as emotionally in order to provide them with adequate treatment options. Furthermore this will assist with their recovery and facilitate their return into the workforce.

After a work injury has occurred, the injured employee must inform the employer, the doctor, physiotherapist, union and Health and Safety Committee. The employer, the injured employee, the doctor, and physiotherapist must complete several injury reports and submit them to the WSIB in 3 days according to *WSIB's Act* (WSIB, nd). Subsequently, other forms must be filled out for HRSDC and the Health Insurance in order to receive the disability benefits that are 70% from the last salary. Later it will explained that these companies represent a major stressor for the injured workers.

Work injuries are regulated not only by WSIB Act, but also by the Occupational Health and Safety Act and the Labor Code, and more recently by the Criminal Code. *Occupational Health and Safety Act* presents in a lengthy, clear and detailed manner the employer's responsibilities. The author of this study believes it is essential to identify just a few responsibilities that are useful to be acknowledged by employers and employees.

According to the Occupational Health and Safety Act (2004 Pocket Ontario OH&S Act & Regulations, 2004), the employer:

- shall pay worker's cost of medical exams, tests, and time spent to such, if required by medical surveillance program (s. 26 (3), pp. 21-22)
- shall not discipline, threaten, dismiss, suspend, intimidate, coerce, or impose any penalty on a worker acting in compliance with the Act, or seeking its enforcement (s. 50 (1), p. 42)
- shall not seek access to a worker health record without the worker's written consent, or by court order (s. 63 (2), p. 56)

The *Canada Labor Code*, in Part II, Occupational Safety and Health section mention that: "every employer shall ensure that the health and safety at work of every person employed by the employer is protected" (Treasury Board of Canada, 2002, Duties of employers, π 1). If employees consider that the work they were asked to perform is dangerous, they have "the right to refuse dangerous work and be protected against dismissal or disciplinary action following a legitimate refusal" (HRSDC, 2006, π 1).

The *Canada's Criminal Code* was amended in 2004 and it states "Every one who undertakes, or has the authority, to direct how another person does work or performs a

task is under a legal duty to take reasonable steps to prevent bodily harm to that person, or any other person, arising from that work or task" (HRM Guide, 2006, π 3).

Federal and provincial health privacy legislation exists. Detailed information on the new federal Personal Information Protection and Electronic Documents Act (PIPEDA) and Ontario Personal Health Information Protection Act (PHIPA) laws can be found in the References list of this study under the websites of the Information and Privacy Commissioner / Ontario (IPC), and Health Canada, Protection of Personal Health Information. The federal and provincial privacy laws came into effect in November 2004, and outlined patients' rights to have their personal health information kept private, confidential, and secure. In addition it imposed regulations regarding the collection, use and disclosure of the patients' personal health information. With this review of the legal matters and health privacy legislation in mind, the next section will present an in-depth discussion on pain and pain-related mental health issues.

To summarize, physical and organizational work risk factors lead to RSIs which in turn lead to human and economic costs. Work injuries are regulated by the Criminal Code, Labor Code, Occupational Health and Safety Act, and WSIB Act.

Pain

The International Association for the Study of Pain (2004) describes pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Pain terminology, π 1). Pain is double-edged sward. On one hand, pain is a warning that there is a problem, for instance "Pain is a message sent by the body to the brain, signaling that disease, injury [...] has caused trouble in some areas" (Balch and Balch, 2000, p. 720). However, when pain does not go

away for months and years it becomes a problem. Thus, there are two basic types of pain, acute and chronic. According to Beth Israel Medical Center (2005, Glossary) and National Institute of Neurological Disorders and Stroke (2006, Two faces of pain, π 2):

- Acute pain [...] results from disease, inflammation, or injury to tissues. This type of pain generally comes on suddenly [...] after trauma [...] and may be accompanied by anxiety or emotional distress [...] it can become chronic.
- Chronic pain is widely believed to represent disease itself. It can be made much worse by environmental factors and psychological factors [...] persists over a longer period of time [...] is resistant to most medical treatments. It can--and often does--cause severe problems for patients (National Institute of Neurological Disorders and Stroke (2006, Two faces of pain, π 2).

According to Wörz (2003) two thousand years ago "the Roman emperor and philosopher Marcus Aurelius wrote: 'when unbearable, pain destroys us...'" (Historical background, π 1). The French medical missionary Dr. Schweitzer wrote in 1931 that "Pain is a more terrible lord of mankind than even death itself" (National Institute of Neurological Disorders and Stroke, 2006, Introduction, π 3). Statistics Canada (2006, Study: Aging, health and work, π 9) reports that "the impact of pain was clearly a concern [...] Almost all of those not working who experienced pain reported moderate to severe levels."

According to Balch and Balch (2000) and Beth Israel Medical Center, Department of Pain Medicine and Palliative Care (2005), it is important to treat pain for the reason that "pain can cause patients to" (Beth Israel Medical Center, 2005, Pain, π 3):

- Experience depression and fell helpless

- Experience disruptions in activity, appetite and sleep
- Feel anxious and anxiety intensifies pain
- Give up hope
- Stop participating in life to the fullest extent possible

Deardorff (2004) and Statistics Canada (2005) report as well that pain interferes with sleep. Philips and Rachman (1996) note that:

> When pain persists for long periods of time, a number of vicious cycles will develop, which paradoxically lead to increasing pain and reduced tolerance. The most common reactions to continuing pain are increasing muscle tension, guarding and disuse, anxiety, anger, depression, preoccupation, or focusing on the pain problem. (pp. 92-93)

According to Fishman and Berger (2001) "A patient may have stopped working, withdrawn from social activities, and even ceased leaving their home. And physical disability may have spawned emotional disability, like depression or anxiety disorders" (p. 232). Philips and Rachman (1996) suggest that "indeed, it should come as no surprise to learn that persistent pain is depressing" (p. 30). According to Wörz (2003) "pain is the cause and depression the result [...] the severity of pain influences its interferences with activity and quality of life" (Depression in pain, π last). Deardorff (2004) holds that it is important to explain to patients the connection between chronic pain and depression "since it demystifies the etiology of the depression and dispels the idea that being depressed is somehow related to a 'weak will'" (Chronic pain and depression, π 2). According to Deardorff (2004, Chronic pain and depression, π 2) and Mayo Clinic (2006, Signs and symptoms, π 1) depression is characterized by the following:

- A predominant mood that is depressed, sad, blue, hopeless, low, or irritable, which may include periodic crying spells
- Poor appetite or significant weight loss or increased appetite or weight gain
- Sleep problem of either too much (hypersomnia) or too little (hyposomnia) sleep
- Feeling agitated (restless) or sluggish (low energy or fatigue)
- Loss of interest or pleasure in usual activities
- Decreased sex drive
- Feeling of worthlessness and/or guilt
- Problems with concentration or memory
- Thoughts of death, suicide, or wishing to be dead

Deardorff (2004, Anxiety, π 2) and Mayo Clinic (2006, Signs and symptoms, π 2) inform us that anxiety is characterized by the following:

- Muscle tension, including shakiness, jitteriness, trembling, muscle aches, fatigue, restlessness, chills, hot flashes, and inability to relax
- Nervous system overactivity, including sweating, heart racing, chest pain, shortness of breath, hyperventilation, dizziness, dry mouth, abdominal cramping, diarrhea, nausea, trouble swallowing/lump in throat
- Apprehensive expectations, including anxiety, worry, fear, anticipation of misfortune
- Trouble concentrating, including distractibility, insomnia, feeling 'on edge', irritability, and impatience.

According to Deardorff (2004) patients think that their anxiety will fade away "when the pain goes away", yet anxiety is "causing a significant increase in pain

perception. This results in a vicious cycle of pain, anxiety, more pain, and more anxiety" (Anxiety, π 3) .

As explained above, chronic pain leads to pain-related mental health issues, such as anxiety and depression. Next, we need to explain how we feel pain in order to directly address pain and indirectly address anxiety and depression.

Longley (2005) explains that:

> [...] the pain pathways are set in motion by receptors in the skin being sparked into action in response to a stimulus, such as a heavy object landing on your foot. These sparks ignite the ends of the nerves like a fuse and the pain signal begins to shoot along the nerve on its way to the spinal cord. (Pain pathways, π 1)

According to Longley (2005) the space between the two nerves is called synapse and the incoming signal has to cross over it. The National Institute of Neurological Disorders and Stroke (2006) states that "Pain is a complicated process that involves an intricate interplay between a number of important chemicals found naturally in the brain and spinal cord [...] called *neurotransmitters*" (A pain primer, π 3). These neurotransmitters "transmit nerve impulses from one cell to another" (National Institute of Neurological Disorders and Stroke, 2006, A pain primer, π 3). One of the neurotransmitters is the endorphins which are our "natural painkillers." In addition, The National Institute of Neurological Disorders and Stroke (2006) argue that "The spinal cord acts as a sort of relay center where the pain signal can be blocked, enhanced, or otherwise modified before it is relayed to the brain" (A pain primer, π 1). Longley (2005) suggests that:

> On arrival at the brain the pain signal reaches its end point [...] producing an explosion of pain. This is the moment when you are consciously aware of the pain and its location. (Pain pathways, π 4)

Figure 1 illustrates Longley's (2005) pain pathways, namely, the neurotransmitters communicate the pain signal between two nerve endings.

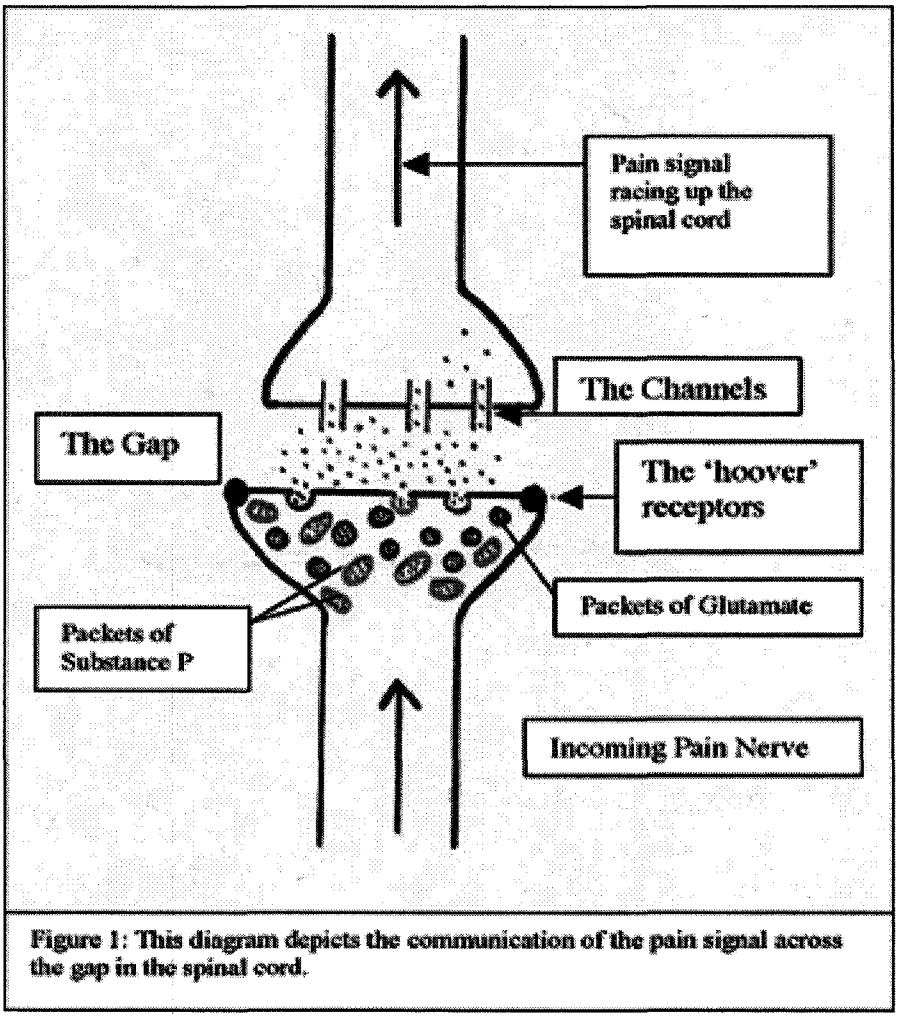

Figure 1: This diagram depicts the communication of the pain signal across the gap in the spinal cord.

Figure 1. Pain Pathways – How your body signals and monitors pain (Longley, 2005).

After the above general discussion on pain and pain-related mental health issues such as anxiety and depression, a more specific discussion on pain and pain-related mental health issues caused by RSIs will follow.

Repetitive Strain Injuries

As explained in the Definitions section, RSIs are also known as overuse injuries or musculoskeletal disorders and they are incorporated in the list of occupational diseases. They are a family of injuries affecting tendons, tendon sheaths, muscles, nerves and joints. If the causes are not eliminated (repetitive rapid movements of a body part such as repetitive finger movements without rest on a keyboard or mouse) or the worker is not moved from the job immediately, the damage can be permanent and irreversible (Canadian Union of Public Employees, 2003; Murphy et al. 2006; National Institute of Neurological Disorders and Stroke, 2004; Quilter, 1998).

As pointed out previously, chronic pain is associated with anxiety and depression and the three (pain, anxiety and depression) can become disabling. Similarly, pain, anxiety and depression caused by work injuries, such as RSIs, can become disabling. Keeping this in mind, it is important to mention that according to the Social Readjustment Rating Scale designed by Holmes and Rahe (1967) "Personal injury or illness" is ranked 6 out of 42 on a scale measuring stressful life events where the first is "death of a spouse" and the last is "person living alone" (p. 216). This scale is included in the Appendix B.

RSIs do not develop over night. Computer workers will notice a few common warning signs before they progress into big problems. According to Quilter (1998) "the most common warning signs" (pp. 1-2) of RSIs are:

- Weakness in the hands or forearms, frequent clumsiness
- Fatigue, lack of endurance
- Tingling, numbness, or loss of sensation
- A feeling of heaviness in your arms
- Difficulty using hands i.e., trouble turning pages, twisting doorknobs or faucets, holding a coffee mug, buttoning clothing
- Reluctance to shake hands
- Difficulty carrying things or holding bus poles
- Waking up with wrist pain or numb hands
- Lack of control or coordination
- Cold hands, tremors, frequent self-massage
- Soreness or mild to excruciating pain, which can be dull, achy, electrical, stabbing
- Avoidance of sports or other activities that were once enjoyable

It is important to recognize the above warning signs because RSIs progress in four stages (Quilter, 1998, pp. 6-7). These stages are presented below:

Stage 1

- Pain and fatigue near the end of the workday
- Symptoms resolve overnight and on days off
- No reduction in work performance
- Condition lasts weeks or months
- Injury reversible

Stage 2

- Recurrent pain and fatigue earlier in the workday

- Night symptoms cause sleep disturbance
- Reduced work capacity
- Physical signs such as swelling or positive reaction to provocative tests such as Tinel's Sign or a nerve conduction study. At this stage, the physical signs may be more discernible to a knowledgeable doctor than to the patient
- Condition persists for months
- Possibly reversible

Stage 3

- Pain and fatigue even during rest and nonrepetitive movement
- Night pain causes sleep disturbance
- Reduced work capacity
- Condition lasts months to years
- Reversibility unlikely

Red Flag

- Numbness, tingling, or burning
- Weakness or clumsiness
- Night symptoms
- Persistent symptoms
- Pain-related behaviors, such as frequent self-massage, protective posture, aversion to touch, wincing and moaning, guarding the affected area

Different authors and/or organizations such as the Arthritis Society, 2005; Canadian Center of Occupational Health and Safety, 1999; Canadian Union of Public Employees, 2003; Gilbert, et al. 1996; Mayo Clinic, 2006; Murphy et al. 2006;

Occupational Health Clinics of Ontario Workers, 2005; and Public Service Alliance of Canada, 2003; classify the above RSIs stages under RSIs symptoms.

The foremost consequence of RSIs is pain. As mentioned above, RSIs lead to chronic pain which in turn lead to physical activity limitations. They impact negatively on daily activities such as writing/typing, house work, office work, and personal maintenance (Quilter, 1998; Tjepkema, 2003). Several authors and organizations explain how the chronic pain along with the physical activity limitations lead to mental health issues, lower worker productivity, absenteeism and, in some cases, extended disability leave (Canadian Physiotherapy Association, 2003; Gilbert et al. 1996; Murphy et. al. 2005; Ontario Ministry of Labor, 2006; Quilter, 1998; Tjepkema, 2003; Workers Health & Safety Centre, 2006).

For these reasons, RSIs often prevent people from "performing daily tasks" (Workers Health & Safety Centre, 2006, Who suffers, Canadian Union of Public Employees, 2003, Who is affected, π 2), from working which creates "significant personal and economic burden for workers" (Johnston, 2005, RSI common in working woman, π 10), and from engaging in recreational and social activities (Deardorff, 2004). According to Workers Health & Safety Centre (2006, Who is affected, π 2) "Many struggle with this emotional challenge" for the reason that the RSIs "consequences are far reaching and can affect every aspect of a worker's life" (Ontario Ministry of Labor, 2006). The loss of self-esteem, especially in those with a strong work ethic, can lead to problems with identity and depression (Philips and Rachman, 1999; Statistics Canada, 2003). Gilbert et al. (1996) briefly summarize how the pain from the physical injury of RSIs leads to psychological injury that is depression:

> Functional limitations may range from minimal, to gravely disabling. Patients frequently experience weakness of the wrists and upper arms. They initially have difficulty with opening jar lids, lifting heavy objects (e.g. groceries), stirring ingredients or driving a stick car. Any extended periods of writing, keyboarding, sitting, standing, lifting, or driving may incur significant pain and weakness. Pain is alleviated by rest in the early stages of the disease, but as fatigue and improper recruitment progresses, pain is constant. Patients many not be able to brush their teeth, blow-dry their hair, or hold their child. Pain and weakness become crippling, and most instrumental tasks are difficult to handle. At this stage depression is common, and a sense of hopelessness builds in over the lack of control in their lives. (p. 58)

Because RSIs affect every aspect of life, Quilter (1998, pp. 116-139) provides handy recommendations intended to help patients in performing different task such as:

- grocery shopping (buying precut vegetables, pushing the cart, not lifting/carrying heavy groceries)
- cooking tips (using soft-handled tools, when cutting angle the food not the wrist)
- eating (training nondominant hand for eating)
- sleeping (using metal braces)
- opening doors (pushing open door with hips or shoulders, pulling inward door walk back hold your arm still use leg and back strength, push elevator buttons with elbows or knuckles to reduce forearm strain)
- reading (turning pages, holding books, chairs with padded arms)

- shaking hands (do not have to shake hands, refuse graciously, or offer the other hand)
- writing (hold the pen between the index and middle fingers, this reduces the tension in the thumb and balances the use of tendons crossing the wrist and small muscles of the hand)
- household tips (move the vacuum handle with whole body instead of pushing it with your arm, ask pharmacist to give easy-to-open cups, install faucets with handles, use electric toothbrushes, jar openers, staples, have easy-to-wear clothing, use a light phone, hold your baby by keeping your hand and forearm aligned rather than bending at the wrist, avoid driving a manual car)
- sexuality tips (disability does not end sexuality or dating, being loved for yourself has nothing to do with your disability, try not to decapitate your partner with your metal brace, communicate your needs with your partner)

In summary, the physical and psychological pain from RSIs can prevent one from earning a living, harm one's career, and interfere with one's normal way of life.

Treatment options such as various medications, cognitive behavioral therapy – the gate control model, and exercise/physical activity along with its effect on chronic pain and pain-related mental health issues will be discussed in the next section.

Treatment Options

Treatment options that deal simultaneously with chronic pain and pain-related mental health issues (anxiety and depression) include various medications, the gate control model, and exercise/physical activity. This section will present brief discussions on various medications and the gate control model, and in-depth arguments on the effects of

exercise/physical activity on chronic pain and pain-related mental health issues. This study proposes the use of exercise/physical activity as a holistic approach to help RSI-injured computer workers live with chronic pain and, especially, pain-related mental health issues, such as anxiety and depression.

Drug therapy

Medication such as anti-depressants and anxiolitics is necessary to treat pain and pain-related mental health issues, however it should not be used as the sole treatment for long-term due to their side effects presented in Table 2 (Appendix C). According to the Beth Israel Medical Center, Department of Pain Medicine and Palliative Care (2005, Glossary):

- Antidepressants [are] Medications used to treat depression, and also used to treat chronic pain. Antidepressants can also be helpful for pain-related symptoms, like sleep problems and muscle spasms.
- Anxiolytics [are] Medications used to treat anxiety, and also used to treat chronic pain. Anxiolytics reduce pain-related anxiety, help relax muscles and can help a person cope with pain.

Table 2 was compiled using information drawn from the Arthritis Society (2005), Canadian Center for Occupational Health and Safety (1999), (Deardorff (2004), Durstine et al. (2003), Mayo Clinic (2006), Murphy et al. (2006), Philips and Rachman (1996), Quilter (1998), and Skrinar (2003). The purpose for designing this table was to help understand the nature of pain medication, its function as well as its side effects. For instance, Durstine et al. (2003) state that drug therapy diminishes one's ability to exercise:

> Most persons with a chronic disease or disability take medicines to treat their medical problems [...] sometimes drugs are recommended as preferred therapy even though they reduce exercise capacity [...] and thereby can have an adverse impact on quality of life. (p. 10)

Furthermore, Philips and Rachman (1996) suggest that drug therapy interferers with the production of neurotransmitters leading to more pain, anxiety, depression, and helplessness:

> The drugs may inhibit, or stop, your own production of a natural morphine-like substance that otherwise would help reduce your awareness of pain. In this situation, you become anxious about the pain and your situation, and tense your muscles. You become depressed, unwilling and unmotivated to become active [...] you feel helpless and defeated. (p. 230)

Due to their side effects (addictive, weight gain, drowsiness, sexual problems) as illustrated in Table 2, the present study will explore a holistic – mental and physical - approach to help RSI-injured computer workers live with chronic pain, anxiety and depression. Specifically, it will focus on social-psychological benefits of exercise/physical activity. According to Durstine et al. (2003) with the help of physical activity "it is sometimes possible to decrease the dose of medications and reap a direct financial return on investment" (p. 14).

The gate control therapy

Deardorff (2004) and Philips and Rachman (1996) suggest the gate control therapy, which is also called self-management of chronic pain, for the reason that it provides patients with active means of learning to control and manage their own pain. The gate

control therapy was developed by Melzack and Wall in 1965 (Deardorff, 2004; Philips and Rachman, 1996). This approach has a positive impact on patients' health as Philips and Rachman (1996) explain it:

> [...] leads to approximately 80% of patients improving, increasing their capacity to participate in and enjoy their lives, ceasing to use drugs and reducing their depression. (p. 232)

However, Philips and Rachman (1996, p. 57) lay down precise criteria (inclusionary and exclusionary) of selecting patients for the gate control chronic pain management program. The first exclusionary criterion refers to:

> People who are involved in unresolved compensation cases or dispute with respect to disability pay [...] There are indications that people involved in litigation do not make gains in behavioral programs until the litigation is resolved.

Tremblay (2006) writes about a study conducted in Quebec by Me Lippel[2] who explains that the compensation system designed to ease the consequences of work injuries in reality it contributes to aggravate them. Consequently, this system has a negative impact on the mental health of the injured workers. For instance in Quebec, more than three workers out of four see psychological injuries add up to their initial physical injury. The injured workers develop depression and several become suicidal during this process. While waiting for their disability pay the injured workers are stuck between doctors and lawyers, spied on by detectives, and as a result several of them break down. Philips and Rachman (1996) and Tremblay (2006) are significant statements to keep in mind because the injured workers cannot improve their health, physical and emotional, while they are involved in a legal battle.

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[2] Me Lippel is professeure au département des sciences juridiques de l'UQAM.

Deardorff (2004), and Philips and Rachman (1996) emphasize the active role played by individuals living with chronic pain in the management of their pain, for instance they actively participate:

> [...] in learning management techniques that will help [...] control and [...] minimize pain. [...] Patients are persuaded to become the active directors of their own improvements, rather than passive recipients of medical treatment (Philips and Rachman, 1996, p. 6).

With respect to the gate control method, Longley (2005), National Institute of Neurological Disorders and Stroke (2006), and Philips and Rachman (1996) hold that pain perception is influenced by messages ascending to the brain and modulated by messages descending from the brain that can attenuate or even block the ascending messages. Consequently, the gate control method teaches patients suffering from chronic pain how they can close the gate (no pain allowed) or open the gate (pain allowed). On the following page Figure 2 is an illustration that Deardorff (2004) uses to help his patients to understand the gate control model. For instance, when the patients open the gate they will experience more pain, in reverse when they close the gate they will be able to attenuate or even block their pain.

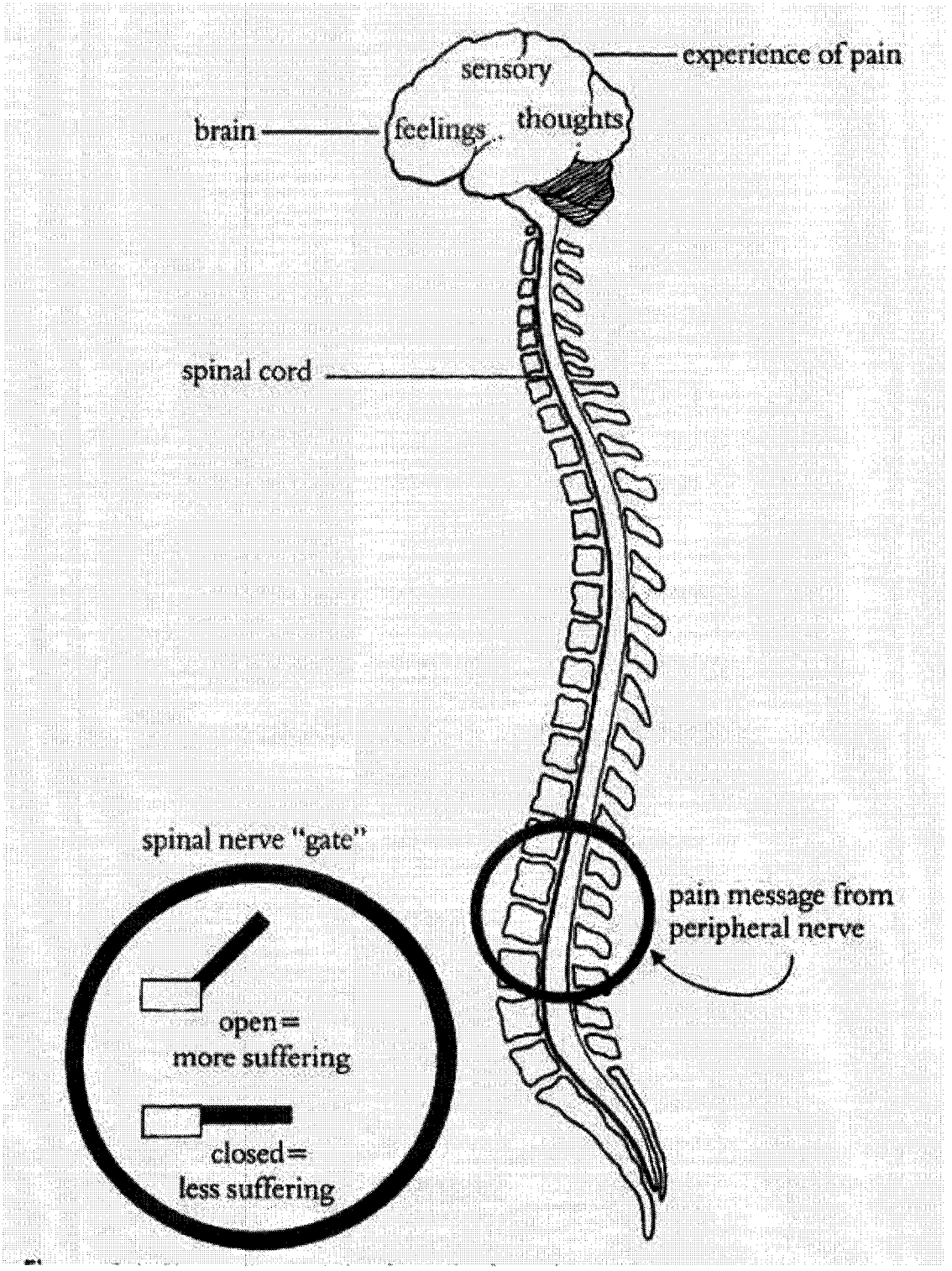

Figure 2. Illustration for patients to understand the gate control theory of pain (Deardorff, 2004)

Exercise/Physical activity

According to Clydesdale (2005) "Exercise is also vitally important. We were meant to move" (What does this mean, π 6). Bailey (2003), Philips and Rachman (1996), and Deardorff (2004), argue that inactivity has a negative impact on chronic pain, muscles, anxiety and depression. Philips and Rachman (1996) explain that "in one week of total immobility, a muscle will lose one-third of its size and power" (p. 230). Deardorff (2004) introduces the concept of the disuse syndrome:

> The disuse syndrome is caused by physical inactivity [...] In the musculoskeletal system, disuse of muscles can rapidly lead to atrophy and muscle wasting [...] Physical inactivity also leads to nervous system changes, including [...] depression, and anxiety. In chronic pain problems, it is most appropriate to exercise and physically recondition oneself. (The deconditioning syndrome, π 2)

As seen above, inactivity has a negative impact because it leads to more pain, which leads to anxiety and depression. Consequently, we need to address pain. The National Institute of Neurological Disorders and Stroke (2006) maintains that the goal of pain management is to improve the functioning of individuals suffering from pain which in turn will enable them to return to office and house work as well as participate in recreational activities. The overall result is an improved quality of life (Bailey, 2003; Minor and Kay, 2003; Meyer and Lemley, 2003; Murphy et al., 2006; Skrinar, 2003). According to Vasudevan (1997) "physical rehabilitation addresses improvement in function through therapeutic exercises designed to increase functional activity" (Therapeutic exercise, π 1). Skrinar (2003) holds that "From a rehabilitation and health care perspective, it is important to recognize that emotional and physical fitness are

central to people's ability to control their lives and create options in living, learning, and working. Exercise is a key component of this process" (p. 316). Accordingly, exercise/physical activity has a positive impact on chronic pain and pain-related mental health issues.

The European Food Information Council (2005, What do we mean by physical activity, π 1) provides definitions related to physical activity. They are:

- Physical activity refers to all energy expended by movement. It includes daily routine activities such as household jobs, shopping, or working.
- Exercise represents a planned activity to improve fitness and health. It includes cycling, aerobic dance, gardening, and walking. "Walking programmes have been shown to help reduce pain, stiffness and disability and improve strength, mobility and overall ratings of life quality."
- Sport represents physical activity involving structured competitive situations governed by rules. In many European countries, the term sport is used to include all exercise and leisure time physical activity.
- Physical fitness means a "set of attributes such as stamina, mobility, and strength that relate to ability to perform physical activity."

Balch and Balch (2000) make a distinction between "recreational exercise" that "is meant for enjoyment and relaxation" and "therapeutic exercise" that "is intended to alleviate or prevent a particular problem" (p. 708). According to the Arthritis Society (2004) and Canadian Physiotherapy Association (2003) in order to have different muscle groups stimulated it is necessary to engage in different exercise activities. The Arthritis Society (2004) argues that "a comprehensive therapy and fitness program" includes five

types of exercises. They are range of motion, stretching, strengthening, endurance and body awareness, and their definitions follows:

- Range of motion exercises help maintain or restore normal joint movement and relieve stiffness
- Stretching exercise help maintain or restore normal flexibility to the joint's muscles and tendons
- Strengthening exercises increase the muscle's ability to provide support and stability to a joint [...] two types of strengthening exercise [...] isometric exercise, you strongly contract the muscle but don't move the joint [...] isotonic exercises use weights or elastic fitness bands to apply mild resistance to the joint
- Endurance exercises are any activities that use the large muscles of your body in a rhythmic, continuous motions
- Body awareness exercises [...] help promote balance, posture and breathing through a variety of therapeutic techniques and recreational activities. (The Arthritis Society, 2004, Cross training, π 2).

The Arthritis Society (2004) recommends five types of exercises and Vasudevan (1997) recommends six, from which four are identical to those of the Arthritis Society. Vasudevan (1997) suggests "A program that combines range of motion, stretching, flexibility, strengthening, general aerobic exercise, and relaxation is necessary to improve function of patients deconditioned by effects of chronic pain" (Strengthening exercises, π 4). The Mayo Clinic (2006) argues that when individuals are inactive they "become deconditioned which may actually contribute the chronic pain." Earlier in this study, Deardorff's (2004) concept of the "disuse syndrome" was presented along with patient's

need to "physically recondition oneself." Now, we presented Vasudevan (1997) and The Mayo Clinic (2006) concepts of "patients [being] deconditioned" along with the need of being physically active as a way to control the pain.

This is true as well for individuals with RSIs. Consequently, as RSIs heal, flexibility and strengthening exercises can begin (The Arthritis Society, 2005; Merck Manual of Medical Information, 2004). These have both a physical and psychological impact. On the physical side, exercise/physical activity does:

- stretches and strengthens muscles, so muscles become stronger taking off load from bones and cartilages, thus fell more relief (Fishman and Berger, 2001; Mayo Clinic, 2006; Murphy et al. 2006; Public Service Alliance of Canada, 2003)
- increases flexibility and as a result joints will move with less pain (Mayo Clinic, 2006; Murphy et al. 2006)
- improves sleep and increase energy level which will help to cope with the pain (Mayo Clinic, 2005; Murphy et al. 2006; National Institute of Neurological Disorders and Stroke, 2006)
- helps prevent relapses (The Arthritis Society, 2004; Mayo Clinic, 2005; Merck Manual of Medical Information, 2004).

Consequently, by avoiding relapses, regular exercise/physical activity is also a weapon against pain (Mayo Clinic, 2006).

Earlier in this study it was presented Longley's (2005) and Philips and Rachman (1996) explanation of the pain pathways and endorphins' role played in the transition of pain massages. Endorphins not only transmit pain messages, they can block this transmission, and furthermore they confer a sense of feeling good or a happy feeling.

Consequently, endorphins have as well psychological consequences. On the psychological side, studies show that during exercise/physical activity endorphins produced in the brain block the transmission of electrical signals between nerve cells carrying pain messages (Laskowski, 2005; Vickers-Douglas, 2006).

Laskowski (2005) a physical medicine and rehabilitation specialist and co-director of the Mayo Clinic's Sports Medicine Center, says: "Endorphins are the body's natural pain relievers [...] have the potential to provide the pain-relieving power of strong medication, such as morphine" (The benefits of movement, π 1). Similar definition is given by Fishman and Berger (2001) who state that endorphin is "a hormone the body generates which is similar to its action to morphine or opiates that can eliminate pain and produce euphoria" (p. 284). According to National Institute of Neurological Disorders and Stroke (2006) endorphins are "responsible for the 'feel good' effects experienced by many people after rigorous exercise" (A pain primer, π 8). Endorphins also help alleviate anxiety, depression, fatigue and sleep problems, conditions that can make pain more difficult to control (European Food Information Council, 2005; Mayo Clinic, 2005; Vickers-Douglas, 2006). High levels are found in athletes, and low levels in chronic pain sufferers (Gilbert et al. 1996; Merck Manual of Medical Information, 2003; Philips and Rachman, 1996). The European Food Information Council (2005) states that "Not only does physical activity have the potential to add years to life, but the evidence is also accumulating that it can add life to years" (Conclusions, π 1).

Vickers-Douglas, a psychologist at the Mayo Clinic (2006) argues that "Just how exercise reduces symptoms of depression and anxiety isn't fully understood. Researchers believe that exercise prompts changes in both mind and body" (How exercise help, π 3).

Franke (2005) and Vickers-Douglas (2006) note that exercise affects in a positive way the levels of neurotransmitters in the brain. Vickers-Douglas (2006) suggests that:

> Exercise may also boost feel-good endorphins, release tension in muscles, help you sleep better and reduce levels of stress hormone cortisol. It also increases body temperature, which may have calming effects. (How exercise help, π 4)

Therefore, exercise/physical activity is essential because it has a positive physical and psychological impact on pain, anxiety and depression.

The European Food Information Council (2005), Skrinar (2003), and Vickers-Douglas (2006) offer lists that comprise other benefits of engaging in exercise/physical activity for depression and anxiety. Below are just a few:

- Confidence, since it confer "a sense of accomplishment [...] make you feel better about your appearance and your self-wroth"
- Distraction, for the reason that "it shifts the focus away ... [to] your surroundings or the music you enjoy listening to while you exercise"
- Interaction, because it "can create opportunities to interact with others, even if it's just exchanging a friendly smile or greeting as you walk around your neighborhood"
- Prevents recurrence, as "Regular physical activity over several years may also reduce the risk of depression recurring" (Vickers-Douglas, 2006, The benefits of exercise, π 1).

In the final analysis "exercise provides an antidepressant effect" (Skrinar, 2003, p. 316). Consequently, regular exercise/physical activity is not only a weapon to combat pain, but also a tool to address pain-related mental health issues. It may be concluded that the same

is applicable to individuals with RSIs suffering from pain and pain-related health issues, such as anxiety and depression.

On one hand, the broad literature on pain presents a strong link among four variables which are chronic pain, anxiety, depression, and exercise. On the other hand, the specific literature on RSIs presents a strong link among only three variables which are pain, anxiety, and depression. While the literature on RSIs also discusses exercise, this is solely for the purpose of strengthening/stretching muscles rather than to help individuals with the anxiety and depression caused by the pain of RSIs.

What is important about this study is that it proposes an approach to understanding and addressing RSIs, as well as the use of exercise/physical activity to help computer workers with RSIs live with chronic pain and pain-related mental health issues, such as anxiety and depression. It is important to understand and address workplace injuries such as RSIs. This study will demonstrate that work injuries not only have an impact on the physical health of the injured workers but also an impact on their mental health.

The next section will reveal the methodological approach used in this study for the purpose of collecting the data. This section will include the research design along with its delimitations and limitations; followed by the context and participants; next the ethics; after that the procedures of data collection; and will end with the data analysis.

Methodology

Research Design

This study has one general research question and two specific research questions. The general research question is: How does RSI affect the lives of computer workers and what they do to alleviate its symptoms? The first specific research question is: How does exercise participation help RSI-injured computer workers live with chronic pain and pain-related mental health issues? The second specific research question is: How is exercise prescription used by health professionals to help RSI-injured computer workers live with chronic pain and pain-related mental health issues?

Postmodernist researchers tend to use more qualitative methods which emphasize the importance of the interviewee's voice and give particular attention to the shared lived experience and feelings. For instance, this study gives voice to the workers who share their daily experience and feelings of living with chronic pain, anxiety and depression. Similarly, it gives voice to the health professionals who share their daily experience of treating complex chronic pain and pain-related mental health issues. Hence, the data was collected from samples of injured RSI workers and health professionals who treat RSI-injured computer workers using a qualitative approach inspired by the postmodernist paradigm. For this purpose, two interview guides were designed to conduct face-to-face semi-structured interviews with participants from two samples. Patton (1990) writes that,

> An interview guide is a list of questions or issues that are to be explored in the course of an interview. [...] is prepared in order to make sure that basically the same information is obtained from a number of people by covering the same material. (p. 283)

The two interview guides for the two samples (computer workers with RSIs and health professionals treating RSI-injured computer workers) are attached in the Appendices D and E. Every effort was made to assure that the questions asked were framed in a neutral and objective manner and presented in a consistent fashion so as to avoid any interviewer bias. The interviews were topical and cultural. The questions asked were non-intrusive, open-ended and close-ended. The interviews were recorded by means of tape recorder and transcribed manually by the sole investigator who was also the interviewer.

Beyond the postmodernist perspective, qualitative research was chosen as the preferred option for this study for several more specific reasons. First, Punch (1998) holds that qualitative methods "are well suited for studying naturally occurring real-life situations [...] are the best way we have to get the insider's perspective" (p. 243). Second, Rubin and Rubin (2005) write that "researchers in sociology [...] education, and health have also found that qualitative methods are what to use when studying a complex and nuanced world" (p. 19). Third, they suggest that qualitative interviews help the researchers to understand experiences and reconstruct events in which they did not participate, to investigate personal issues, to see life from different perspectives, to "understand our work life [...] how people deal with stress on the job" (Rubin and Rubin, 2005, p. 4). Forth, Gubba and Lincoln (1994) explain that "Human behavior, unlike that of physical objects, cannot be understood without reference to the meanings and purposes attached by human actors to their activities. Qualitative data [...] can provide rich insight into human behavior" (p. 106). Fifth, according to Rubin and Rubin (2005) "Qualitative interviews are conversations in which a researcher gently guides a conversational partner in an extended discussion" (p. 4). Finally, as Dunne (1995) explains, "A writer's

interview involves asking a designated person (or persons) for information and opinions in a structured way and recording the answers appropriately" and interviewing is used "to give you the opportunity to write about people you are interested in and whom you think are worth writing about" (p. 3).

In this light, the present study used qualitative data collection. It is true that "statistical analysis" identifies "trends and relationships" (Rubin and Rubin, 2005, p. 24), however, feelings such as pain and emotions such as anxiety and depression, for injured workers, are not usually found in statistical analyses. For these reasons qualitative data collection was chosen for this study.

Rubin and Rubin (2005) group interviews in two categories, topical and cultural. Topical interviews "explore what, when, how, why, or with what consequences something happened" and the researchers "listen carefully to learn the perspectives of the interviewees, [...] choose the initial topic" (Rubin and Rubin (2005, p. 11). Cultural interviews "explore the ordinary, the routine, the shared history [...] the expected behaviors of a given group of people" and the researchers ask the conversational partners "to describe a typical day or ordinary occurrences, allowing the conversational partners plenty of room to portray what is important to them" (Rubin and Rubin (2005, p. 10). For the reasons explained above, this study used both categories of qualitative interviews, that is topical (for the topics of pain, anxiety, depression, and exercise) and cultural (for the culture of injured workers and health professionals).

Because of the strengths and weaknesses of open- versus close-ended questions, the interview guides designed for this study asked both types of questions. On one hand, close-ended questions gives the respondents limited choice of possible answers from

which they identified the answer that corresponds to their circumstances. Gray and Guppy (1999) indicate that close-ended questions are "much like a multiple-choice exam" (p. 92). Fraenkel & Wallen (2003) report as strengths the following "data analysis is simple, responses can be directly compared and easily aggregated, many questions can be asked in a short time" (p. 457). They present weaknesses as well such as the "respondents must fit their experiences and feelings into the researcher's category, may be perceived as impersonal, irrelevant, and mechanistic" (Fraenkel & Wallen, 2003, p. 457).

On the other hand, open-ended questions confer to the respondents the opportunity to briefly answer questions about their own feelings, opinions, experiences, etc. Open-ended questions are "analogous to short-answer questions on exams" (Gray and Guppy, 1999, p. 92). According to Fraenkel & Wallen (2003) a few of the strengths are "respondents answer the same questions, thus increasing comparability of responses, [it] facilitates organization and analysis of the data" (p. 457). They mention as weaknesses "little flexibility in relating the interview to particular individuals and circumstances, standardized wording of questions may constrain and limit naturalness and relevance of questions and answers" (Fraenkel & Wallen, 2003, 457).

According to Gary and Guppy (1999) when designing questions researchers must keep in mind that the respondents know what the researchers ask them, know the answer, are unwilling to accept the answer to themselves, are wiling to admit the answer to researchers, and respondents can be biased. Fraenkel & Wallen (2003, pp. 458-459) give guidelines for interviewing techniques. For instance the six types of interview questions that can be asked are the following:

- background or demographic (education, income, occupation, age)
- knowledge (factual information as opposed to opinion or values)
- experience or behavior (description of present or past experiences)
- opinion or values (what do you think about certain beliefs, goals, attitudes)
- feelings (how do you feel about that particular event)
- sensory (what did you see, hear during the mentioned incident).

The two interview guides used in the present study included questions from all the six types of interview questions presented above.

According to Fraenkel and Wallen (2003, p. 456) there are four different types of interviews and they often can be combined. They are:

- structured and semi-structured (formal, used to obtain background information, consist of specific questions to obtain specific answers)
- informal (resemble conversations, used to find out what people think, consist of no specific questions)
- retrospective (can be structured, semi structured, or informal, used to recall and then reconstruct from memory past events)

In order to collect data, the sole investigator in this study also conducted face-to-face semi-structured interviews.

Dunne (1995) proposes that "a face-to-face meeting is best, [...] is the most satisfying way of conducting an interview because your interviewee has set aside a specific amount of time to see you and because you have the opportunity to delve deeper into your subject and gain more information" (p. 7). As previously discussed, while face-

to-face interviews was used to collect data for this study, one must acknowledge Kidder and Judd's (1986, p. 231) list of strengths and weakness of "personal interviews":

- Cost: high
- Data quality. Response rate: high, respondent motivation: high, interviewer bias: moderate
- Sample quality: high
- Possible interview length: very long
- Ability to clarify and probe: high
- Ability to use visual aids: high
- Speed: low
- Anonymity: low
- Dependence on respondent's reading and writing ability: none
- Control of context and question order: high

Delimitations and Limitations

Locke et al. (2000) and Lu (2004) argue that "every study has its limitations and delimitations (Lu, 2004, Limitations and delimitations, π 1). Berg and Latin (2004) explain that "Delimitations are the what, who, where, and the when of the study" (p. 37). They indicate that delimitations "summarize what is included in a study: the nature of the subjects, the location of the study, its duration, and variables studied" (Berg & Latin, 2004, p. 37). According to Locke et al. (2000) "Delimitations describe the populations to which generalizations may be safely made" and "Limitations, as used in the context of a research proposal, refer to limiting conditions or restrictive weakness" (p. 17). Berg and

Latin (2004) hold that "Limitations are events that may interfere with the results of a study and that the researcher cannot control" (p. 37). They argue that "No study can perfectly control all factors in the environment, and therefore even the best-designed and best planned studies have one or more limitations" (Berg & Latin, 2004, p. 37). In this light, the present study has its own delimitations and limitations.

The small sample size limits the ability to draw conclusions about RSI-injured computer workers and health professional treating RSIs in general represented the delimitation. However, with respect to the sample size in qualitative research, Punch (1998) states that the "samples are usually small" (p. 243). A few limitations anticipated in this study were asking computer workers to talk about their daily pain without feeling they are complainers and/or weak and asking health professionals to talk about the treatment they prescribe for pain and pain-related health issues for the reason that they were not interested in this study focusing on exercise.

Context and Participants

In order to pick a sample that is accessible for face-to-face interviews, with a limited budget, this study was conducted on two samples involving 16 participants. They are eight RSI-injured computer workers and eight health professionals treating RSIs. With respect to the small sample size used in qualitative research Rubin and Rubin (2005) write,

> Do not apologize for qualitative methodology by saying [...] 'I interviewed *only* 10 people'. Instead, you explain why you picked the cases you chose, what they exemplified or what experiences the 10 people you interviewed had that made them important for the study. (p. 253)

Rubin and Rubin (2005) recommend that researchers explain why particular participants were picked for the study and what made them important. For instance, RSI in blue collar workers has been given much more attention, but in white collar workers much less research has been conducted. Moreover, most of the research concerned the biomechanical aspect of the RSI while research on the mental aspect is relatively scarce. Therefore, this study will add to the understanding of addressing the physical as well as the mental aspect of this type of injury in white collar workers. In addition, the data collected in this study was not only from the RSI-injured computer workers but also from the health professionals who treat RSI. In this way, an additional perspective was obtained through the health professionals' views on exercise/physical activity prescription to help RSI-injured computer workers live with chronic pain and pain-related mental health issues.

This study took place in the National Capital Region. Since it was not a Canada-wide study, it was conducted in one of the official languages, that is English, thus the participants were proficient in English. However, the recruitment text Appendix F and the consent forms Appendices G and H were translated and used by two French speaking participants.

The method used to recruit potential participants for both samples was snowball sampling, also called chain or network (Neuman, 2003; Patton, 1990). Neuman (2003) defines snowball sampling as "a method for identifying and sampling (or selecting) the cases in a network" (p. 214). He explains that this method is "a multistage technique" because "it begins with one or a few people or cases and spreads out on the basis of links to the initial cases" (Neuman, 2003, p. 214). According to Patton (1990) snowball

sampling "begins by asking well-situated people: 'Who knows a lot about_____? Who should I talk to?'" (Patton, 1990, p. 176). The Collins Dictionary of Sociology (2005) holds that the snowball sampling method is used "primarily in the collection of in-depth, qualitative data, perhaps on sensitive topics… and the best methods of selection is through personal contacts" (p. 560).

Selection criteria

The selection criteria for RSI-injured computer workers are as follows:

- Employment: public service
- Location: National Capital Region of Canada (Greater Ottawa area)
- Duties: a range of 4-6 hrs/day of computer work
- Age: 30 – 65
- Gender: equal number of males & females
- Language: proficient in English
- Pain experience: at least 1 year experiencing pain in the dominant hand from RSI
- Physical activity level: self reported regular physical activity – usually "a few times a week" (e.g. walking, exercise, gardening, biking, skating, skiing, swimming, hiking)

The selection criteria for health professionals treating RSI-injured computer workers (not necessarily their own patients) are the following:

- Occupation: health professionals who treat RSI-injured computer workers for pain and pain-related mental health issues (anxiety, depression)
- Location: National Capital Region of Canada (Greater Ottawa area)
- Gender: equal number of males & females

- Language: proficient in English

Recruitment procedures

The initial contact to request participation was made by email and the recruitment text was attached. If the potential participants responded indicating they were willing to participate, the researcher made sure that they meet the selection criteria which are listed above. If they were not willing to participate, they were thanked for their consideration. If they did not respond there was a follow-up phone call and/or email in which the recruitment text was repeated. During the follow up calls several individuals mentioned that they deleted the email sent from the University of Ottawa email account thinking it was spam or their anti-spam system notified them of a "suspicious sender" due to university email address's looks. As a result, emails were sent from sympatico email account and the response rate increased. Others said that they forgot to answer and expected a reminder.

Searches for potential participants were conducted on the websites of public service departments, unions, hospitals, physiotherapy and health clinics, as well as from the phonebook. Accordingly, the individuals who met the selection criteria were contacted by email and the recruitment text was attached. This text asked them to forward it to colleagues (injured RSI workers and/or health professional) who would be able to contact the researcher directly if interested. In this way, the confidentiality of the participants was ensured.

The majority of contacted individuals from both samples mentioned that they were "understaffed", "not sure how quickly I will be able to get an answer to you", "I deleted it because I do not have time", "I have a heavy workload and this is additional

work", "how fast do you need this", "I'm sorry I haven't been able to respond to you yet - just swamped during working hours", "some members at CAPE did not want to participate", "I once knew a woman who had a wrist operation because of use of the computer mouse. I told her we were now surgically altering people to make them suit our new machine age", or they never answered the emails or returned phone calls. In summary, even if the contacted individuals mentioned that "the study is very interesting" they did not have time because they had too much work.

In order to recruit RSI-injured computer workers, numerous public service departments were contacted by email and/or phone. They are Agriculture Canada, Canadian Revenue Agency, Canadian International Development Agency, Citizenship and Immigration Canada, Environment Canada, Foreign Affairs, Health Canada, Human Resources and Social Development Canada, Immigration and Refugee Board, Industry Canada, National Defense, Office of the Auditor General, Office of the Privacy Commissioner of Canada, Public Works and Government Services Canada, Social Development Canada, and Statistics Canada. Keyword searches were conducted on the Government Electronic Directory Service Direct500 website on http://direct.srv.gc.ca/cgi-bin/direct500/BE for potential positions, such as Disability, Injury, Health, Claims, etc. The directory found several positions with individuals' names, their phone, email, and address. In addition, emails were sent to the National Council of Federal Employees with Disabilities, National Educational Association of Disabled Students, Ottawa and District Injured Workers Group, RA Centre Government Services Division, University of Ottawa Access Services, and Workers Health & Safety Center. Furthermore, the Directors, Labor Relations Officer, and Health and Safety

Officers from unions like Public Service Alliance of Canada, Professional Institute of the Public Service of Canada, Canadian Union of Public Employees, and Canadian Association for Professional Employees (CAPE) were contacted.

The president of Statistics Canada Local of CAPE went beyond and above to help recruit participants. He sent emails with the recruitment text to the following and copied the researcher: CAPE Vice-President, Chairperson Workplace Wellness Committee, Workplace Committee on Occupational Health and Safety Policy, Occupational Health and Safety Officers, and a colleague. As well, he posted it in French and English in the cafeteria, and near the entrance for most data-entry employees. Discussions emerged around the topics of RSI health implications and legal implications after any work injury. As a result, he invited the researcher to give a brief presentation on RSI on the RSI Awareness Campaign in the Public Service. The presentation was made in January 2007 to Statistics Canada Workplace Committee of Occupational Health and Safety.

In order to recruit health professionals treating RSI, chronic pain, and pain-related mental health issues, numerous health professionals were contacted by email and/or phone. Their names were found on websites, in the phone books and/or were provided by their colleagues as was mentioned earlier. These health professionals were working at Elizabeth-Bruyère Health Centre Physical Medicine and Rehabilitation, Central Ottawa Family Medicine Associates, Health Canada Workplace Health and Public Safety Programme, Herridge Community Health Centre, LifeSource Rehabilitation Health Centre, Ottawa Hospital Chronic Pain Program, Royal Ottawa Hospital Rehabilitation Center, SunLife Rehabilitation, Sports Medicine and Physiotherapy Centre University of Ottawa, University of Ottawa Institute of Mental Health Research Stress and Anxiety

Research Unit, Westboro Physiotherapy Centre. Extremely helpful was an RSI participant who at the end of the interview handed the researcher her son's business card. He is the co-owner and a health professional in one of the above mentioned health clinics. Several interviews were conducted with health professionals working in this health clinic.

A health professional, shortly after accepting to be interviewed, unfortunately emailed that she would be on sick leave for an undetermined period of time. Another health professional initially emailed that he obtained the authorization from his supervisor to participate in the interview, however when contacted several times later he never answered the emails. He also wrote "unfortunately, the medical clinic is too busy at the moment to respond to your request." Receptionists at different medical clinics said "our busy doctors do not have time." Extremely helpful was a Service Nurse Clinician working at the Rehabilitation Center, Chronic Pain Program in a local hospital. She was contacted from the phonebook. She provided an extensive list with names, addresses, telephones, and emails of health professionals treating RSI, chronic pain, anxiety and depression in hospitals and private clinics.

Two groups of participants

The first sample was drawn from a range of public service employees. Their socio-demographic characteristics are shown in Table 3 (Appendix I). All RSI-injured computer workers are employees of the public service and have postsecondary education. There were 5 women and 3 men. Their ages ranged from the 30s to middle age. These workers performed similar tasks (keying, mousing, and typing) by using similar technology (computer keyboard and mouse) in similar work environments (public service office). These conditions led to similar musculoskeletal injuries (wrist, forearm, elbow,

shoulder, and/or neck). Since these occupational groups are well represented in the public service, face-to-face interviews with RSI public service employees were conducted. Given that this group of workers who use computers lives with RSI, they were selected for their subjective as well as personal experience of RSI, pain, anxiety, depression, and exercise therapy.

The second sample was drawn from a range of health professionals who treat RSI-injured computer workers. They did not treat any of the workers interviewed in this study. Their socio-demographic characteristics are presented in Table 4 (Appendix J). They work at a Rehabilitation Health Center and a Physical Medicine and Rehabilitation Health Center. There were 4 women and 4 men. Their ages ranged from the 29 to middle age. Since these health professionals are well represented in the health centers, face-to-face interviews were conducted with them. Given that this group of health professionals treats chronic pain and pain-related mental health issues, they were selected for their objective as well as medical knowledge of RSI, pain, anxiety, depression, and exercise therapy.

Every effort was made to interview an equal number of male and female participants of different ages for the reason that age, gender and biological differences must be acknowledged. For example, musculoskeletal fitness declines with age and women have smaller bodies and muscle size (Payne et al. 2000). In addition, the type of work and gender will have an impact on the participants' health given that more women are employed in clerical work (women do more computer work) and more men are employed in managerial positions (men do less computer work) (Canadian Union of Public Employees, 2003; Johnston, 2005; Public Service Alliance of Canada, 2003). This

was confirmed by this study's sample of the RSI-injured computer workers. The two holding Master's degrees and management positions are males.

Six potential RSI participants were rejected because they did not meet the selection criteria presented above. For instance, three just retired and another one was age 68 planning to work until age 70. Since one of the interview questions is about future career plans, the decision was made to focus on workers up to age 65, recognizing that most workers over 65 would be planning for retirement and not future jobs. Of course this is a generalization that does not apply to everyone, but when planning a research study it is necessary to identify the scope of the population and age was one of the criteria. Another potential participant was rejected because although she had the carpal tunnel surgery in both wrists she stated that she "did not develop her carpal tunnel from work-related duties" and this research focuses only on RSI caused by daily computer office work. The last one was rejected during the interview, although she asked numerous questions before accepting to be interviewed and was sent the selection criteria, when question 6 was asked (Do you participate in regular physical activities?) she answered No. Probes were used, e.g. Do you walk, exercise, garden, shop, cook, clean? She answered No. Therefore, she was told that the questions 6 to 8 became irrelevant.

Interviews with both samples lasted approximately one hour, the shortest interview lasted 45 minutes and the longest lasted 90 minutes. Approximately 24 hours after the interviews personalized "thank you" emails were sent to all participants. With one exception because she was knowledgeable, all RSI-injured computer workers were sent information promised during the interview, that is:

1. animated hand & neck exercises from the Arthritis Canada

http://www.arthritis.ca/tips%20for%20living/exercise/joint%20exercises/select%20an%20exercise/default.asp?s=1

2. very useful book Quilter, D. (1998). The repetitive strain injury recovery book (1st ed.) Markham, Ontario: Thomas Allen & Son Canada. Among other things it teaches you how to do basic activities (opening doors, shaking hands, shopping, writing (holding a pen), cleaning, cooking, holding your baby, etc)

3. prescription topical analgesic & anti-inflammatory: Pennsaid

4. PSAC & CUPE websites have very good info on RSI

http://www.psac.com/what/healthsafety/H&S_RSI_Bulletin-e.shtml

http://cupe.ca/www/HealthSafetyBackground/4223

5. look in the yellow pages for physiotherapy clinics who treat RSI or musculoskeletal injuries or work injuries.

6. it is the worker's responsibility to inform management about their hand pain and numbness, if the worker does not say anything the management does not know the worker is injured. Management and Health & Safety Committee have the legal responsibility and duty to contact Health Canada for an ergonomic assessment of your workstation, it is done by qualified Occupational Therapists, they are very useful, and mention to them the pyramidal keyboard $79.00. Get one at home too.

7. a knowledgeable counselor for the management of chronic pain and pain-related mental health issues is …

8. ask your doctor to send you for an EMG (electromyography) to see if the nerves in your hand/forearm are damaged.

9. fleece wrist warmers from Shoppers DrugMart about $10.00 and fingerless gloves $1.00, from the Dollar Store

During the interviews with the RSI-injured computer workers one of them asked what can be done for her recurrent carpal tunnel. Since she is a Registered Nurse, shortly after the interview she was sent a few medical articles that answered her question.

To sum up, all the interviews conducted, with the participants from both samples, provided rich, deep data that will be analyzed later in this study.

Ethics

There are many scientific reasons to conduct research and/or experiments involving human subjects. According to the Medical Research Council of Canada, the Natural Sciences and Engineering Research Council of Canada, and the Social Sciences and Humanities Research Council of Canada the Tri-Council Policy Statement (2003) explains that,

> Research involving human subjects is premised on a fundamental moral commitment to advancing human welfare, knowledge and understanding, and to examining cultural dynamics. Researchers, universities [...] undertake or fund research involving human subjects for many reasons, for example: to alleviate human suffering [...] to dispel ignorance [...] and to understand human behavior and the evolving human condition. (Ethical conduct for research involving humans, π 1)

Nowadays, when conducting research with human subjects ethical principles have to be taken into considerations and researchers must follow eight strict guiding ethical principles. These principles are: respect for human dignity, respect for free and informed

consent, respect for vulnerable persons, respect for privacy and confidentiality, respect for justice and inclusiveness, balancing harms and benefits, minimizing harm, and maximizing benefits (Tri-Council Policy Statement, 2003).

This present study did not conduct any experiments with human subjects. In order to collect the data for this study, face-to-face semi-structured interview guides with two small samples was administered. As indicated above, the first sample included computer workers with RSIs and the second sample consisted of the health professional treating RSI-injured computer workers. They were asked non-invasive, semi-structured, open- and closed-ended questions. Nevertheless, ethics approval was obtained (Appendix K).

In order to respect anonimity and confidentiality, participants were assigned case numbers and the analysis section of the study was reviewed to ensure that there is no residual disclosure of personal information that could identify the participants. During the conduct of the research the written transcripts and audio tapes were kept in author's home office (secured by monitored alarmed system); electronic data files will be kept on University of Ottawa laboratory computers (secured by password and student number). All results and data (tape-recordings and transcripts) will be transferred to a locked filing cabinet in the office of the supervisor at the University of Ottawa for a period of 5 years post-publication after which they will be destroyed.

Procedures of Data Collection

As pointed out previously, two interview guides were designed to conduct face-to-face interviews. Some probes were used with very few participants to "help manage how interviewees answer questions" (Rubin and Rubin, 2005, p. 164).

Interviews were recorded by means of a tape recorder and transcribed manually by the interviewer. Fraenkel and Wallen (2003) propose that "A tape-recorder [...] is often considered to be an indispensable part of any qualitative researcher's equipment" (p. 462). According to Dunne (1995) tape recorders "are particularly good for long interviews where gathering a log of quotes and information is necessary" (p. 21). Fraenkel and Wallen (2003), and Dunne (1995) suggest to researchers to also carry a notepad and pencil, just in case. Dunne (1995, p. 19) provides several advantages for using a tape recorder during the interview:

- records everything with total accuracy and requires a minimum of effort on your part
- leaves you free to give your interviewee your total attention
- can catch nuances in tone which are lost on notepads
- can play back the interview as many times as necessary
- can give a professional fell to the whole preceding
- can help to create your image as a professional person who takes what they are doing seriously

However, according to Dunne (1995, p. 19), using a tape recorder has as well the following disadvantages:

- some people really do not feel comfortable when talking into a tape recorder and may become more concerned about the sound of their own voice on tape
- ask 'is it alright if I use this'
- because of its professional appearance a tape recorder can be intimidating in particular to 'ordinary people'

- the opposite can happen – some people feel very important talking into a tape recorder – you may find that your interviewees are less likely to be themselves if they know that they are on tape

As pointed out above, probes were used. Probes are techniques to keep the conversation going and they are "verbal and non-verbal" (Rubin and Rubin, 2005, p. 164). Non-verbal probes include silence which "can actually be very productive in an interview" (Dunne, 1995, p. 65), thus waiting "a bit for the interviewee to continue talking, leaning forward to express interest" (Rubin & Rubin, 2005, p. 164). Guidelines for using verbal probes are given by Rubin and Rubin (2005, pp. 164-171) as follows:

- Continuation probes to encourage "the interviewee to keep going on the present subject" for instance "and …?", Mmm Hmm. So…?"
- Elaboration probes "ask for more details or explanations of a particular concept" such as "can you tell me more about that?"
- Attention probes allow "the interviewee know that you are listening carefully" for example "I understand"
- Clarification probes ask "the interviewee to explain something that you simply did not follow" such as "can you run that by me again"
- Steering probes are used when the "conversation goes off track" for instance "sorry I distracted you with that question"
- Sequence probes are used to "learn the order of events" for example "how much first-hand experience [you] have had on the subject?" or "could you tell me what happened step by step?"

- Slant probes "help you determine the lenses through which people see and interpret their worlds" such as "how did you feel about?"

As previously indicated the interviews were manually transcribed by the interviewer who followed Dunne's (1995) and Rubin and Rubin's (2005) recommendations. Dunne (1995) suggests that "The golden rule of transcribing is do it as soon as possible" (p. 95) for the following reasons:

- The interview is fresh in your mind
- You are able to see whether anything significant is missing
- The sooner you transcribe the interview to sooner you can get on with writing it up

According to Rubin and Rubin (2005) "transcribing the interviews yourself forces you to pay attention to what interviewees said and helps you prepare for the next interview" (p. 204).

The interview locations and times were at the participants' convenience and comfort. For instance the location was in their office, shopping malls, office building's cafeteria, and their home. The time of the interviews was during lunch time, during working hours and after working hours. The occurrence of background noise interference depending on the location of the interviews must be acknowledged for the reason that occasionally had to pause recording due to loud noise.

Data Analysis

The purpose of this study was not to measure pain, anxiety, and depression, but to see how exercise/physical activity helps computer workers with RSIs live with chronic pain and pain-related mental health issues (such as anxiety and depression). In order to do this,

the data for this study were collected using a qualitative approach and analyzed using NVivo qualitative software. Punch (1998) holds that "Qualitative data have a holism and richness, and are well able to deal with the complexity of social phenomena. This is what is meant when qualitative researchers talk about data providing thick descriptions" (p. 243). Miles and Huberman (1994) explain that the process of analyzing qualitative data is a craft:

> Doing qualitative analysis means living for as long as possible with that complexity and ambiguity, coming to terms with it, and passing on your conclusions to the reader in a form that clarifies and deepens understanding [...] It's right to say that qualitative data analysis is a craft – one that carries its own disciplines. There are many ways of getting analyses 'right' – precise, trustworthy, compelling, credible – and they cannot be wholly predicted in advance [...] we can all be as vivid and rich in describing our own work as we are in describing the inner and outer lives of the people we are studying. (pp. 309-310)

In this light, the craft or strategy used for the analysis of the rich qualitative data was to look at the research questions and emerging nodes or themes that answered the research questions. For instance, the emerging themes that had to do with the general research question (How does RSI affect the lives of computer workers and what they do to alleviate its symptoms?) were: Pain symptoms, Pain frequency, Repetitive work, Anxious feelings, Depressed feelings, Pain coping strategies, and Pain response.

In the same way, the emerging themes that touched on the first specific research question (How does exercise participation help RSI-injured computer workers live with

chronic pain and pain-related mental health issues?) were: Physical activity, Pain perception, and Mood perception. Similarly, the emerging themes that dealt with the second specific research question (How is exercise prescription used by health professionals to help RSI-injured computer workers live with chronic pain and pain-related mental health issues?) were: Symptoms, Treatment, and Patient understanding. Accordingly, these themes represent the skeleton on which the analysis was built.

Coding interviews with NVivo

Tappe (2002) explains that "Qualitative analysis is a term applied to a very wide range of methods for handling data that is relatively unstructured and not appropriately reduced to numbers" (p. 10). She claims that NVivo qualitative software provides tools for coding visually rich data records as well as it "offers many ways of connecting the parts of a project, integrating reflections and recorded data" (Tappe, 2002, p. 11).

The preliminary NVivo structure for the "tree nodes" was based on the content of the interviews. Each question was coded under a particular tree node and nodes had sub-nodes or sub-themes. It was effective and efficient to code one question at a time for each interview. The rationale was to seek emerging themes for each identical question asked of the different participants. In this way, the similarities (e.g., happy feelings after physical activity) and differences (e.g., use of prescription drugs) among participants were noted.

Several modifications were made to the preliminary NVivo structure of the tree nodes in order to accommodate all participants' responses. Coding with NVivo allows one to inspect and/or change node properties, create child nodes (or subnodes), code, uncode, cut, copy, rename, and/or delete nodes.

Appendix L contains a reproduction of an NVivo document which corresponds to an interview with one of the eight computer workers. Appendix M includes a reproduction of an NVivo document which corresponds to an interview with one of the eight health professionals. These documents show a coded interview in Document Browser mode with the Coder as well as the Coding Stripes turned On. The tree nodes along with their child nodes are not the same for both computer workers and health professionals.

The next section will reveal the results of this study where the themes that emerged from analyzing the interviews using NVivo can be found.

Results

This section presents the results of 16 interviews. Eight are with a sample of RSI-injured computer workers. The other eight are with a second sample of health professionals who treat chronic pain and pain-related mental health issues in computer workers with RSIs. This section is divided into two subsections, which are the computer workers' portraits and key findings, and the health professionals' portraits and key findings.

Computer Workers' Portraits

Computer worker 1

This is a male manager, aged between 41 and 50, and has a master's degree in business administration. He is married with two pre-teen children. He has experienced pain since 2000 when he "joined the federal government." He developed sharp pain in the right hand from repetitive work (writing and mousing). He uses an ergonomic chair, keyboard and mouse. "To rest the other hand" he develop ambidexterity and to "minimize the

clicking" he developed a method of using Excel. He experiences pain during the day even after he stops clicking the mouse, it wakes him up during the night, and it has a "negative psychological impact."

He is "definitely" worried, scared, and concerned about his future health as he is "aware that this does not get better, is a kind of one way street." As a manager he does less computer work and delegates more. Thus, with respect to career and finances he does "not think is going to threaten [him] that way." He did "not tell anyone" about his pain because he is "afraid" of being negatively perceived. He is "looking for another job."

His work injury "is the source" of his painful and clumsy hands which have "broad consequences" as it "impacts the rest of [his] life." When he used power tools around his house, he injured himself, so he developed creativity to use them. He plays less ping-pong and musical instruments. Pain became part of his life and he said "I cannot ignore it, so I desensitize because otherwise how can you live with it?" To alleviate his pain he takes Ibuprofen, time off, does self-massage, and he tries to control his posture which "helps but the pain never goes away the area is always painful at touch."

He does "some form of exercise every day," walking daily, skiing, and house maintenance work. During these activities he does not feel pain because he focuses on them. After being physically active he feels "invigorated, more energetic and pain free, more full of life, therefore more positive." He does not exercise at the office because he does "not know what desk exercises are."

Computer worker 2

This is a female French Writer/Editor, aged between 41 and 50, who has a bachelor of arts degree and a translator's certificate. She is single and has no dependants. She has

experienced pain since 1995 when she "was clicking repetitively all day" as well as doing overtime. As a result, she developed a painful ganglion cyst on the back of the right wrist. Lately she experiences pain in the elbow, shoulder and neck due to typing and writing. She experiences pain at work, doing daily chores, driving, and it wakes her up at night.

Her "health worries" her and she plans to ask her doctor for a shoulder and elbow x-ray. With respect to her career she does "not worry too much" as well she does not worry about her finances because she is "not there yet." She reported the injury to her manager, will have an ergonomic assessment, and is looking for another job. To alleviate her pain, at work she has to stop to relax her hand, has an ergonomic chair, controls her posture, exercises with a ball, and at home she puts Chinese compresses, ice and heat "to help the blood flow," takes Ibuprofen, glucosamine with condroitine, did physiotherapy, Reiki, and was hypnotized for the pain. She stated that the "government is not as open to employees' pain, they are not concerned, they do not take it seriously [...] and you cannot take too many days off because they do not understand. If you have flu they will understand, but if your shoulder hurts they do not understand."

Due to the work injury, she is creative in finding new ways to do the activities she used to do (biking, skiing, plying violin). Even if she is "sad" to have lost the quality of life, she is happy and forgets her pain when she is physically active indoors and outdoors.

Computer worker 3

This is a female Programmer/Analyst, aged between 51 and 65, who has two bachelors degrees plus a certificate in computer programming. She is married with three adult children. She has experienced pain and weakness in her thumb for "at least two years" due to clicking the mouse repetitively all day. During the day she gets "electric stabbing

pain" in her hand and thumb, and drops objects. During the night she wakes-up with pain in the shoulder and neck, and numb hand. She "always dismissed" the pain, is "annoyed and angry," and "blamed" herself. She had to learn ambidexterity and "develop techniques" in order to carry out her work in the office and home.

With respect to her future career she is not worry because she plans to take an early retirement in two years, and she accumulated over 100 days of sick leave. From financial point of view, she does not "have to overly worry, whatever pension [she will] have, it will be fine" because her husband will have "a very good pension." She reported her injury to two doctors and a physiotherapist (all of whom told her that she may need surgery), and her manager, who requested an ergonomic evaluation and suggested she take regular breaks. To alleviate her pain, she takes Ibuprofen, uses ice, exercises, wears a metal brace at night and an elastic one when driving. She participates regularly in aqua fitness, which "de-stresses" her, helps her sleep, and makes her "feel great." In this way she hopes to avoid the surgery.

Computer worker 4

This is a female Senior Analyst, aged between 51 and 65, who has two bachelors degrees. She is married with two adult children. She had experienced pain for about 6 years due to her repetitive computer work for "at least 4-6 hours per day." Initially she had pain only in the right arm, but more recently the pain extended to the neck area. Early mornings the "pain is bearable, but after five hours of intense computer work the pain gets worse as the day progresses."

With respect to her future health she is "definitely concerned." She is not planning to change her job and/or retire, but if the pain is increasing she will have to "take early

retirement." If this happens, "will be a little hard, because [she is] used to the full income right now." She reported the injury to her manager and was scheduled to have an ergonomic assessment. She is "against medication," and to alleviate her pain she uses "natural approaches." Thus, she controls her posture, takes time off, does self-massages, stretching exercises, Yoga, sleeps on magnetic mattress, goes to physiotherapy, athletic therapy, and acupuncture at her son's clinic.

She feels "sad and deprived" because the pain interferes with her office work, cooking duties for her family, and her quality of life. The reason she regularly goes to gym and Yoga is because it "makes a big difference." To be precise, "it relaxe[s her]," she feels "less pain and stress, sleep[s] better, feel[s] better about [herself], and [has] more energy."

Computer worker 5

This is a male Senior Policy Advisor, aged between 41 and 50, who has a bachelors of science degree and a master's degree in business administration. He is married with a young child. He has experienced pain "predominantly in the right wrist" for about three years when using the mouse. Recently he was diagnosed with bilateral carpal tunnel syndrome, was told he may need surgery, and he "will try to avoid it." The pain interferes with his night sleep, leisure, house maintenance work, but he is "adapting to it," and has to be "careful." He deals with "many different health problems" and the hand pain is "one more thing" to deal with.

He does less keyboarding/mousing and more thinking since he is "in management position." He is not worried about his career because "as long as I can think, I know, I can do something." He reported the injury to his doctor and manager, had an ergonomic

assessment, and he uses an ergonomic keyboard. To alleviate his pain, he takes regular breaks, exercises his wrists and neck, and sleeps with metal braces.

His daily walking routine during lunch time de-stresses him after a difficult morning, he feels "much better," it helps the day go faster and makes it more enjoyable because he does not have "one full work day," he has "two half days."

Computer worker 6

This is a male Information Technology Officer, aged between 41 and 50, who has a college diploma in computer programming. He is single and has no dependants. He has experienced pain "for at least five years mainly in the wrist" due to working on the computer all day. Lately, the wrist pain started to progress to the inside of the forearm, elbow, and shoulder. The quantity and quality of his office and house work, along with his leisure activities are limited by his pain and fatigue. He "learned to live" with the pain. For several reasons he takes leave without pay instead of sick leave.

With respect to his career he is "not concerned too much" since he still has "paid vacation and sick leave." He feels "sad" because he "cannot work as much as [he] did and as fast as [he] did." He reported the injury to his manager (had two ergonomic assessments), doctor, and he had physiotherapy. To alleviate his pain, occasionally he takes Ibuprofen, time off, uses an ergonomic chair, tries to control his posture, and occasionally does desk exercises hoping he can avoid the surgery.

When he hikes or mountain bikes in Gatineau Park he feels "excited," he does "not pay attention to the pain," he feels "good," and thus "pain free."

Computer worker 7

This is a female Importation and Business Services Agent, aged and 41 and 50, who has a college diploma in administration. She is married with two late teens still living at home. She has experienced pain since 2000 when it started "like a knife feeling in the wrists." She developed a ganglion cyst on her hand, was misdiagnosed with carpal tunnel, unnecessarily had surgeries to both hands, and received WSIB benefits. Her work injury changed her life "totally, it stopped it," she "went into a state of depression," and she does "not have a quality of life."

With respect to her future health she is "angry, sad," and "scared that the pain will get worse in time," the medication will stop working, and WSIB will stop paying her medication. With respect to her career, she feels she is "scrutinized and blacklisted," and feels "discriminated" against. She uses "the Dragon," voice activated software, but she is "still fighting to get accommodated." In terms of finances, she looked "into medical retirement," but she "cannot afford it." She believes that when a public servant has a work injury "it should be like any other medical retirement, you should be able to retire with full pension because they caused it. The rules are, the duty to accommodate, but there is nobody there to implement and enforce them." To alleviate her pain, she uses braces, takes medication (anti-inflammatory, muscle relaxants, sleeping pills, anti-anxiety, and anti-depressant), did physiotherapy, and went to rehabilitation clinic at the hospital. The employer sent her to a psychologist who diagnosed her with "classic difficulty learning to deal with disability."

Due to the work injury she is creative to find new ways to do the activities she used to do (walking her dogs, biking, running). When hiking and exercising she feels

"fantastic, positive, the stress goes away, feel good about yourself, and think I am normal again, because you do something normal."

Computer worker 8

This is a female Policy Analyst, aged between 41 and 50, who is a registered nurse. She is single with three young children. She has experienced pain for "about 6 years from working extensively on computer." She had bilateral carpal tunnel surgery, received WSIB benefits, and experiences recurrent carpal tunnel. The pain interferes with house and office work, sleep at night, and she is tired. This pain is "annoying and always there, but you learn to live with it."

She "already changed" her career and indicated that "it is scary because without your hands you cannot do anything, you are pretty disabled." She worries her hands "may get worse." The ergonomic assessments were not helpful and she has "been reluctant to report" that her hands are "getting numb again because [she does] not want to bother them." With respect to her finances, she is "too young" to retire and thus the pension will be too small. She asks herself several questions, "what does the future hold, how long can I work with these hands, do I want to have surgery again, is there any other possible treatment that would help?" She injured herself several times while cooking due to clumsy hands, developed ambidexterity and creativity, and "learned how to cope with it." To alleviate her pain, she does daily desk exercises, tries to control her posture, she keeps her wrists straight, she has a special mouse pad, she runs her hands under hot water, had physiotherapy, went to a professional trainer and she takes Ibuprofen and/or Tylenol 3. Being a single mother with three young children "going up and down the stairs two floors

with laundry baskets probably eight loads per week at least, [she] can work out a real sweat doing house work."

Every weekend she hikes around her cottage near Shawville. After she hikes she feels "better, cheerful, more energized, the fresh air and everything in the forest, you do not think about your pain." Although, she realizes her hand is getting numb and she starts "to move it around, try to rub it and get it going."

Computer Workers Key Findings

When considering the general research question about how RSI affect the lives of computer workers and what they do to alleviate its symptoms, several themes became apparent. These themes are: Pain symptoms, Pain frequency, Repetitive work, Anxious feelings, Depressed feelings, Pain coping strategies, and Pain response.

The first theme is ***Pain Symptoms*** which refers to what the workers feel physically. It has three sub-themes:

- *burning/ice-cold* ("burning elbow and stabbing neck," "the wrist is burning," "ice-cube hands")
- *numb/lock/clumsy/weak/shaky* ("my thumb was sore and weak," "my fingers would cling so hard that I actually wake up in the morning with nail prints in the palm of my hands," "holding a pen steady was very painful, so I very seldom write with a pen because it locks my hand," "I frequently drop things")
- *pain/swelling* ("it stared with a sharp pain," "my right hand was extremely swollen," "it was like an knife feeling in my wrists")

In short, the RSI-injured computer workers experienced a wide range of physical symptoms. Specifically, their fingers lock and their hands get burning or ice cold, numb, clumsy, weak, shaky, swollen, and painful.

The next theme is ***Pain Frequency*** which relates to how often, when, and the time the pain started. This theme has three sub-themes:

- *day/work/leisure* ("if is a lot of clicking then my arm hurts even after I stopped, ("it is difficult to play music with string instruments because you need to use your fingers," "I play less ping pong with my daughter")
- *night/sleep* ("it kept me awake at night," "I wake up and put deep cold cream, ice, and take painkillers at night," "I cannot sleep and I am tired")
- *year it started* ("when I joined the federal government in 2000," "few years ago in 1995," "for at least five years")

Briefly, the injured workers experienced pain day and night for a number of years.

The next theme is ***Repetitive Work*** which describes the type of work and its acute consequence, namely surgery and disability. This theme has two sub-themes:

- *work* ("I do a lot of clicking," "I do a lot of mouse working").

Six workers out of eight answered that they work on computer over six hours per day.

- *surgery/WSIB* ("I had bilateral carpal tunnel surgery")

Two workers had carpal tunnel *surgery* (although one was misdiagnosed and unnecessarily had the surgery) and received *WSIB* benefits. In addition, three workers were told they may need surgery in the near future, and one has recurrent carpal tunnel, hence she may need to have more surgery.

In sum, all injured workers performed daily, for several hours, repetitive computer tasks. Some of them had surgery and received disability benefits from the WSIB.

Anxious Feelings is the next theme which describes how the workers feel emotionally, precisely their worries. All RSI-injured computer workers answered with a resounding "Yes" when asked if they worry about their future health. Some worried about their future career and finances. This theme includes three sub-themes:

- *health* ("my future health, I am definitely concerned about," "do I worry, yes, and the worry causes me stress, which causes me pain. If I am scared, yes. If I am concerned about my future, yes. Did the pain change my life, oh my God, yes, totally, it stopped it")
- *career*: *other job* ("I applied for other jobs, but I am screened out as disabled," "I already changed my career, with computers I thought I had less injuries and in fact now I have one of the most serious injuries that I had ")
- *finances* ("as soon as I get more financially stable with the two kids out the door," "I need to stay here for the pension, I am a single mom with three children")

In brief, all computer workers worried about their future health, some looked for other jobs, but not all worried about their future career and finances.

The subsequent theme is ***Depressed Feelings*** which refers to how the workers feel emotionally, specifically their distress. It has two sub-themes:

- *prone to accidents* ("I was handling sledgehammer, I could have completely lose my finger, I lost my fingernail that is just growing back now," "I used to be able

to hold and carry a pot with boiling water with one hand. Not now, I have to use both hands because I learned I dropped too many things")

- *life quality* ("it makes me sad to lose my quality of life, the use of my dominant hand, the pain takes my energy away, it drains me, evenings I am tired," "I went into a state of depression, I have a lot of anger, I am crying, I have hard time. I was under the quilt a couple of months just crying. I could not go to the grocery stores without crying. I gained 20lb, I just sat there and eat and cried. It was horrible. I do not have a quality of life")

In short, all RSI-injured computer workers were distressed because they had injured themselves, which in turn affected their quality of life.

The theme ***Pain Coping Strategies*** describes what the injured workers did in order to complete their daily duties. This theme has eight sub-themes:

- *ambidexterity/creativity* ("the only way I can manage is by changing hands," "I have two dogs, I cannot hold the leashes anymore, so I put them on my waist," "I do cross country with one hand attached")
- *drugs* ("I cannot take Ibuprofen non-stop," "extra-strength Tylenol, but I am always afraid because I am at work, I am driving or with the kids," "I am on Lyrica [anti-depressant], muscle relaxants, anti-inflammatory, to sleep is a prescription that turns off my brain not to think, not to worry, it shuts the brain off and fall asleep. If this does not work, I also have Lorazepam [anxiolitic]".
- *subconscious/dismiss pain* ("you learn to live with it," "focusing on something else I probably do it subconsciously," "I always dismissed it")

- *self massage* ("I do this without even thinking and I feel that it helps to massage your painful area," "sometimes by late afternoon I am going like this to relieve myself of pain")
- *hydrotherapy* ("I wake up and put ice," "at home I would put ice on it, then warm, alternate cold warm")
- *night brace/mattress* ("I have braces, the metal one to support the wrist at night," "I sleep on a magnetic mattress")
- *physiotherapy* ("I have pain specialists at my son's clinic, and my son checks me all the time, he is my pain specialist," "I did not have physiotherapy for the wrist but for the shoulder," "I did physiotherapy numerous times, I went to the Rehab")
- *exercise/posture* ("I do aqua fitness," I go to the gym three times per week and sometimes I go for yoga," "I do what you call passive exercise when you contract and relax the muscle isometric while I am sitting all day," "I do my stretches, I am in the habit of doing like this throughout the day")

To sum up, the workers completed their daily tasks by developing a number of strategies, such as using both hands or alternating them, medication, dismissing their pain, self-massage, hydrotherapy, braces, physiotherapy, and exercise.

The theme ***Pain Response*** is the last theme and it explains what the RSI-injured computer workers did in their workplace. The theme has three sub-themes:

- *ergonomics* ("I am waiting for an ergonomic evaluation," "I switched to track ball," "an Occupational Therapist came and he checked my workstation")
- *time off* ("some days is so bad that I just do not go to work, I just take the day off," "the doctor puts me off for a couple of weeks")

- *reported injury* ("I did not yet tell anyone recently, I did not mention that is getting numb again," "I did not mention to the manager since complaining is not good, I am not telling anyone, because I am afraid")

Briefly, in their workplace the RSI-injured computer workers requested an ergonomic assessment, took time off, and some reported their injury to the manager but others were afraid to do so.

When considering the first specific research question about how exercise/physical activity participation help RSI-injured computer workers live with chronic pain and pain-related mental health issues, three themes became apparent; physical activity, pain perception, and mood perception.

The first theme ***Physical Activity*** describes the types of activities in which the workers participate, and it has three sub-themes:

- *house/yard* ("I do some form of exercise every day, construction work in my house, up and down the ladder, bending and stretching," "house work as a single mom with three kids, going up and down the stairs two floors with laundry baskets probably eight loads per week at least, I can work out a real sweat doing house work")
- *leisure* ("this summer I swam regularly at Meech Lake and it was very good for my arm," "biking is a problem because my wrist hurts, also my elbow, shoulder hurt, so I paid to modify my bike," "I love walking and hiking, I have a cottage near Shawville where I go weekly")

- *exercise* ("at work I contract the muscles and relax to keep the blood flowing", "aqua fitness I started about three years ago three times per week," "I push my arm against the wall until I feel heat")

In short, all RSI-injured computer workers were physically active around the house/yard, engaged in leisure activities and exercised.

The subsequent theme is ***Pain Perception*** which refers to what the workers feel physically during physical activity participation. It has two sub-themes:

- *unawareness* ("the pain was not as bothersome as long as I was doing aqua fitness, last month I stopped and suddenly my hand swelled," "I actually feel better after I walk, I feel more energized, the fresh air and everything in the forest, you do not think about your pain")
- *awareness* ("you do not feel pain because you focus on something else, like I was not thinking about my pain while I was walking for this interview, but now you raise my awareness of pain and it is painful all the time," "I play violin, it is a good exercise, but holding the bow with one hand and the violin while pinching the cords is hard, but it forces me to lift my arms")

Briefly, the workers did not feel the pain and felt better while physically active because they focused on that activity. However, if the activity involved the injured hand they sometimes felt the pain.

Mood Perception is the last theme which describes how the workers feel emotionally during and after physical activity participation. It has two sub-themes:

- *positive* ("I feel more energetic and pain free and feel more alive even though I am tired," "when I swim or play the violin I forget the pain", "when I go for walks I forget completely my pain, I think about other things when I am in the forest and listen to music, I forget the pain, that is why I do it")
- *negative* ("there is so much I would like to do, I get angry, it is so frustrating, I cannot drive a car, we have standard," "depending on what I am doing, if it is more painful I usually stop or slow like shoveling after heavy snowfalls")

In sum, all RSI-injured computer workers, felt happy and forgot the pain during and after physical activity participation. However, if they overdo it, they felt unhappy because pain limits them.

Due to their work injury, all eight computer workers have experienced pain, swelling, numbness, shakiness, weakness, clumsiness, and burning/cold in their hands/wrists, forearm, elbow and shoulder. In addition, their fingers lock. They have experienced pain for over four years which interferes with daily activities and night sleep. One of them was misdiagnosed with carpal tunnel syndrome and unnecessarily had surgery, while another who had the surgery but nevertheless developed recurrent carpal tunnel. They both were on disability and received WSIB benefits. They are all anxious and sad about their future health because the work injury changed their lives. However, not all are worried about their career and finances. For instance, a younger worker having many years until retirement emphasized that she worried more about career and finances than an older worker being closer to retirement. Similarly, the two managers worried less than a lower level worker. All workers have weak clumsy hands which make them prone to accidents which in turn have a negative effect on the quality of their life.

In order to complete their daily activities, all the injured computer workers had to be creative to develop pain coping strategies. For example, they became ambidextrous, used braces and drugs, took time off, did physiotherapy and self-massage, dismissed their pain, and exercised. In their workplace, some reported the injury to the management but others did not. Additionally, they requested an ergonomic assessment and took time off.

All engaged in physical activities, such as house and yard maintenance, regularly participated in leisure activities (e.g., walking/hiking, skiing), and exercised at gyms or did aqua fitness. Nonetheless, in order to work around the house and to engage in leisure activities, they all had to develop creative pain coping strategies to be able to do what they used to enjoy prior to their painful work injury. For example, one man attaches a hammer to his belt so as not to drop it on his toes and another had to buy an electric screwdriver because he could use a manual one. Equally, a few of the women attach their painful arm to the waist when they run or cross-country ski to reduce the hand/wrist vibration during the run or arm swing during the ski. If they participate in activities that uses the injured hand for too long (e.g. cooking or playing a musical instrument), it makes them aware of their pain and may become negative about it because it interferes with the activity.

On the other hand, while they engaged in these physical activities, the RSI-injured computer workers' pain and mood perception improved. On the physical side, they feel more energetic, do not feel pain and forget it because they focus their attention on the activity they enjoy (e.g., painting a wall or swimming). On the mental side, they feel good about themselves, invigorated, relaxed, positive, more alive and cheerful. This represents the most drastic change in the RSI suffers. When discussing their pain, their

tone was distressed and their facial expression sad. However, when dealing with their feelings during and after participating in exercise/physical activity their tone brightened and they exhibited a happy expression. For instance, when the computer workers hiked or skied in the forest they said that they are distracted by sounds (e.g., birds' song, wind's whisper through the trees, stream's murmur), colors (e.g., leaves, flowers, sky), encounters with wildlife (e.g., hare, deer, heron), and picturesque trails around Ottawa. In addition, they feel better after they were physically active, namely, they were stress-free and happy after they returned home. Consequently, physical activity not only was beneficial during the activity itself, but it also had lasting benefits which in turn had a positive impact on their quality of life. As a result, it can be concluded that physical activity participation helped the RSI-injured computer workers live with chronic pain, anxiety, and depression.

Health Professionals' Portrait

Health professional 1

This is a female physiatrist (a medical doctor specialized in chronic pain) aged between 51 and 65, who works in a Physical Medicine and Rehabilitation Health Centre. She treats patients suffering from chronic pain, anxiety and depression with medication, recommends ergonomic assessments, and teaches exercising. In her practice she encounters "a few individuals" who have problems because of the "significant psycho-social-financial stresses they are at times becoming suicidal." She sees medication as having both strengths and weaknesses in the treatment of chronic pain and pain-related mental health issues. She perceives attending pain management support groups and/or reading the internet as both beneficial and harmful.

As a patient she would like to be educated about the cause of pain and receive "some common sense intervention [...] which is not necessarily medical," along with medication for pain, sleep, depression, injection of cortisone and Botox. She would like to be treated in a "holistic approach" to be able to have a "reasonable lifestyle even if there is pain." If she were a patient suffering from chronic pain and pain related mental health issues, she would feel "hopeless, helpless, and useless." She understands pain because she suffers from migraines since childhood. "Pain and depression go hand in hand [...] and anxiety and depression are caused by chronic pain."

She stated that pain is real, it is not in the patients' mind, and "anyone who reports pain has pain." However, she gave a few examples of cases where she felt individuals were "over-reporting" their pain because "they may have some secondary objectives."

Health professional 2

This is a male Naturopathic Doctor and Certified Bowen Therapist, aged between 30 and 40, who works in a private Rehabilitation Health Clinic. To treat RSI, he recommends an "ergonomic assessment to prevent further aggravation," demonstrates different stretching and breathing exercises, does Bowen therapy, administers naturopathic and homeopathic therapies. In his practice he encounters RSI patients, one had to retire with a small pension in his late 30's and another "wanted to pull his hair" because of the "irritating annoying" pain. He sees Western medicine as weaknesses because it is "like a Band-Aid solution, isolated, very localized, so is not holistic in their approach."

As a patient, he would prefer a "non drug approach" because they provide "similar results without side effects." He is opposed to the use of sleeping pills and anti-depressants because people "become like zombies." For anxiety and depression he

indicated that he "would like to be treated just by talking it out." About exercise, he said "I think everyone should do some kind of physical activity, the body is meant to move."

If he were a patient suffering from chronic pain and pain related mental health issues, he would be "miserable." He pointed out that pain, anxiety and depression are "becoming a prevalent condition that is under-diagnosed."

Health professional 3

This is a male Certified Athletic Therapist, aged between 26 and 30, who works in a private Rehabilitation Health Clinic. He deals with the "musculoskeletal side of things" and uses "scientific quantitative measurements" (pain scale, grip strength test) to show patients that "they are doing better and recovering vs just being depressed." He gives patients exercises to do at home and at work at their desk. In his practice he encounters patients who "are a couple of nurses who have desk jobs," whose RSI interferes with their work, and because of the pain they find it to be "frustrating, discouraging at times." He sees as a weakness in his profession the treatment of anxiety and depression because he comes across over-medicated patients.

As a patient, he would "look away from western medicine and look towards holistic medicine, osteopaths or naturopathic doctor, if western medicine did not work." If he were a patient suffering from chronic pain and pain related mental health issues, he "would be mostly frustrated." He understands pain because few times he "was in constant pain" for few weeks. For him, it would be "narrow" to simply diagnose it is an RSI and it would be "probably the toughest thing without looking at the complete aspect of it," namely musculoskeletal, anxiety, and/or depression.

Health professional 4

This is a male physiatrist, aged between 41 and 50, who works at a local Physical Medicine and Rehabilitation Health Centre. He uses "pretty much everything [...] a multidisciplinary, call it holistic [...] looking at the global picture: work, home, the person, manager, mother, child." His multidisciplinary approach as well includes looking at "sleep habits, ergonomics, exercise, besides psycho-social factors." In addition, he indicated that "there are multiple ways to look at what is illness." He encounters patients whose RSI interferes with their lives and he finds it "a tragic situation." Medication and exercise are seen as strength in the treatment of pain and pain-related mental health issues. Like the first health professional, he suggested that insurance companies should pay for treatment because people cannot afford to pay.

If he would experience chronic pain and pain-related mental health issues, he answered "Of course no one can like that, being in pain, no one likes being in pain." He would want "to get to the root of the problem [...] get a global perspective and approach to it." As a patient suffering from chronic pain and pain-related mental health issues, he would want to receive a holistic treatment that looks "at anxiety and depression in itself and in the context of the environment at work, home [...] from medical aspect of being in pain." He would like to be treated with medication, such as narcotics, anxiolitics and anti-depressants because they "help suffering." However, he recognized that these medications can not solve all the physical and psycho-social problems.

He argued that our society uses an approach that is "extremely fragmented" and "not very cohesive" as physicians have different attitudes because their "own pain experience as physicians influence how they treat their patients."

Health professional 5

This is a female Doctor of Chiropractic and ProAdjuster Certified, aged between 26 and 30, who works in a private Rehabilitation Health Clinic. A lot of her patients have RSI, and are "unable to do their daily jobs due to the pain, it bothers them, it affects their daily activities." She looks "up and down the kinematics chain because different muscles can cause different dysfunctions." She does a postural exam to see if patients "are able to stabilize their spine during movements," she "will manipulate the spine [...] stretch tight muscles and relax, and try to facilitate weak muscles that stabilize the spine," and the patient and herself "are in co-rehab exercises" where she teaches them exercises to prevent injuries. She explains her patients that physical activity helps them because it "actually decrease their chance of injuring again."

If she were a patient suffering from chronic pain and pain related mental health issues, she would be "very frustrated." She can see how pain drives people "crazy," and understands "why they go through what they do, because pain is difficult thing to deal" and "is debilitating to individuals. Luckily I have not experience that!" If she were a patient she would like to be treated the same way she treats her patients, that is "teach them to be pain free, show we care about them."

Chronic pain and pain-related mental health issues "is half physical and half psychological." She pointed out that "if the person is not mentally able to deal with the pain it inhibits the whole lifestyle and their activities."

Health professional 6

This is a female Naturopathic Doctor, aged between 26 and 30, who works in a private Rehabilitation Health Clinic. To look "at the entire picture" she asks her patients

specific information. Weaknesses in the treatment of pain, anxiety and depression are: being overmedicated, not being understood, and not having the root cause addressed. Naturopathic medicine treats "a combination of mental, emotional and physical aspects," thus is a strength because it has many alternatives to offer without any side-effects. She suggested that people should have the choice of treatment because "We live in a democratic society, but it does not give us all the choices that are available out there. People do not have coverage for naturopathic medicine."

When asked how she would feel if she would experience chronic pain and pain-related mental health issues, she responded "I am not great with pain to begin with, if I have a headache is quite debilitating for me [...] I do not like being in pain."

She feels sympathy for the suffering of people with disabilities because "They have been in that state and do not want to be that way anymore." She is surprised by "the number of people who come here and have been called hypochondriacs." In addition, she has great esteem for people who suffer from chronic pain "and function on daily basis."

Health professional 7

This is a male Doctor of Acupuncture and Doctor of Natural Medicine, aged between 26 and 30, who is the co-owner and practitioner in a private Rehabilitation Health Clinic. He is "a patient advocate," treats chronic pain, anxiety and depression using "a combination of modalities" and encourages his patients to have an active lifestyle because "exercise can come in a variety of forms." Carpal tunnel surgery, cortisone and Botox injections are overused and he strongly opposes their use because they "are like double-edged swards." Weakness is the fact that we "do not see integrated health" and "there is not a global approach to tackling" chronic pain and pain-related mental health issues. Strength is to

"have both allopathic and naturopathic medicine working together to allow multiple interventions to tackle the same problem."

If he would experience chronic pain and pain-related mental health issues he indicated that he "would not feel too good." He would "ask questions" and would "read about [...] to educate" himself. If he would suffer from chronic pain, anxiety and depression, as treatment he would want "Everything possible! The best possible."

Chronic pain, anxiety and depression meant that the "stress is one of the root causes to all disease." Dealing with "absurd" insurance companies, such WSIB, has a psychological impact on patients. He suggested that insurance companies should pay for treatment because people cannot afford to pay.

Health professional 8

This is a female Registered Massage Therapist, aged between 30 and 40, who works in a private Rehabilitation Health Clinic. She treats patients with RSI and/or chronic pain with hydrotherapy which "makes a vascular flash," and does massage techniques to "help release the hyper-tenacity of the muscles." She teaches hand exercises and abdominal deep breathing techniques which "induces them to relax." She has "some clients who had to stop working for a while from RSI." Surgery and cortisone injection should not be the first treatment option for an RSI. Natural approaches represent strengths in treating RSI because "A natural approach, as far as you can go, cannot harm you."

She takes "seriously" the patients suffering from chronic pain and pain-related mental health issues. She believes "they need to be helped," and that "depression follows pain quite quickly." In addition, she considers that "chronic pain is one of the hardest things to deal with for them and any one treating them." She highlighted the importance

of taking care our hands "because mostly what you do, you need your hands, arms. You need that in everyday life, so is something that you have to take it seriously." When asked how she would feel if she would experience chronic pain, anxiety and depression, she mentioned she experienced all the symptoms of carpal tunnel in her right hand during pregnancy when she could not take medication. She said "I do understand what the pain is like, I know exactly what it feels like, it took a good couple of months for it to subside." For these reasons she indicated that she was "anxious" that the pain "was going to stick."

Health Professionals' Key Findings

When considering the second specific research question about how is exercise/physical activity prescription used by health professionals to help RSI-injured computer workers affect the lives of computer workers live with chronic pain and pain-related mental health issues, several themes became apparent. These are Symptoms, Treatment, and Patient understanding.

The first theme is ***Symptoms*** which refers to what the health professionals treat in RSI patients. It has three sub-themes.

- *inflammation* ("Cortisol is a natural anti-inflammatory, the body is in constant inflammatory state and there is nothing to support their natural anti-inflammatory state," "If there is RSI and [people are] eating chips or Kraft dinner and chocolate bar [...] there is no way that the body can be able to reduce that inflammation if they eat junk foods")
- *chronic pain-RSI* ("I had to treat people with both lateral and medial epicondylitis")

- *anxiety/depression* ("I go by addressing both physical and emotional health when it comes to chronic pain because these are very complex cases")

In short, in their practice the health professionals treat RSI-injured computer workers who suffer from inflammation, chronic pain, and anxiety/depression.

The next theme is ***Treatments*** which describes what approaches the health professional use to treat RSIs. It has five sub-themes.

- *medication*: *anti-depressants, anxiolitics, narcotics, cortisone*, and *Botox* ("I think one of the strength is the type of medication that is available for mood and depression, there are many that have fewer side effects that older drugs," "you need medication. There is nothing wrong with medication for the pain, sleep, depression, anxiety. They are helpful")
- *over-medicated* ("the psychiatric field medication is playing with the brain chemistry," "the greatest weakness is that people with chronic pain are not understood and over-medicated")
- *exercising*: *stretching/strengthening* ("muscles do heal if you get better blood flow with an exercise, you can return your strength, I think you can with exercise," "I give specific stretching exercises for the body parts or the muscles that are involved in the pain experience"), and *breathing/progressive relaxation exercises, stress management techniques, yoga, tai chi* ("The breathing does not only help with the physical side, but also the mental emotional side of the pain")
- *holistic/global/total/integrated* ("multiple interventions and modalities, a complement, adjunct, alternative not a replacement," "I want a holistic treatment which will look at the anxiety, depression in itself and in the context of the

environment at work, home, what is going on and will look at medical aspects of being in pain in the same time," "Cannot treat complex chronic pain and mental illness in one way [...] providing everything one needs is total health care.")

- *natural common sense* ("natural drug free approach is better, like for anxiety and depression I would like to be treated just by talking it out," "common sense intervention which is not necessarily medicinal, do exercising to help you, and straighter posture, mattress to improve your sleep")

To sum up, even if the health professionals prescribed different treatments, such as medication, holistic, natural, they all prescribed engaging in physical activity/exercise.

The last theme that emerged is ***Patient Understanding*** which relates to the health professionals' attitude regarding pain and insurance companies. It has four sub-themes:

- *pain is real* ("No it is not in your mind, if you validated their pain this is goal attained," "I am a patient advocate")
- *over-reporting* ("there could be some over reporting in some cases, there they may have some secondary objectives")
- *under-reporting* ("I think it is becoming a prevalent condition that is under-diagnosed. People are not telling their health care providers they are experiencing pain or anxiety, they think they are ageing and not feeling well")
- *insurance stressors* ("WSIB forces injured workers to go back to work when their injury is no healed," "the insurance adjusters are so unaware and so uneducated as to what health care is")

Briefly, the health professionals trusted their patients when they report pain. However, one believed that pain is over-reported, yet others that it is under-reported. Nevertheless, all agreed that insurance companies are stressful for the injured workers.

All the interviewed health professionals treat patients suffering from the symptoms of RSI (e.g., chronic pain, anxiety, and depression). The health professional recognized that these symptoms prevented the RSI-injured computer workers from earning a living, harmed their career and interfered with their normal way of life. The health professionals hold different opinions with respect to the treatments they prescribe, such as medication (anti-depressants, anxiolitics, narcotics, cortisone, Botox), exercise (stretching, strengthening, breathing), holistic (multiple interventions), and natural common sense (good mattress). Thus, they expressed different beliefs with respect to what they view as strengths and weaknesses in the treatment of chronic pain and pain-related mental health issues. For instance, the use of medication was seen by the health professionals as a strength because it helps suffering, but also as a weakness as well because some patients were over-medicated. This was confirmed by a RSI-injured worker who often could not function at work and at home as a result of the side effects of taking multiple prescription drugs.

However, they all prescribe, encourage, and demonstrate exercises to their patients, not just exercise in gyms but physical activity in general because exercise can come in a variety of forms. As one health professional said "is not aging, what it is, is deconditioning, you allow your body to decondition." Furthermore, the health professionals advocate participation in physical activities because it helps alleviate the pain, anxiety, and depression. For instance, the health professionals recognized that

insurance companies and WSIB are major stressors for the injured workers and it makes them feel more pain, anxiety and depression. On the other hand, being physically active helps reduce pain, anxiety and depression. For example, physical activity participation produces endorphins in the brain which in turn can diminish pain and enhance satisfaction. Accordingly, if patients feel less pain they feel more joyful.

While the health professionals understood their patients and believed them when they reported feelings of pain, one felt pain was at times over-reported. Yet, one RSI-injured computer worker preferred to take leave without pay instead of paid sick leave because he felt his doctor would not understand his pain. The other health professionals felt pain was under-reported.

To sum up, the key findings are the following. The RSI-injured computer workers reported that exercise/physical activity participation helps them live with pain, anxiety, and depression. Explicitly, it helps them forget the pain which in turn made them feel better and happier while being physically active. Moreover, they feel better after they participated in exercise/physical activity. This confers them a sense of empowerment. As a result, their quality of life is improved. This was echoed by all the interviewed health professionals who reported that they prescribe exercise/physical activity precisely for the same reasons. Namely, focusing on the activity that patients enjoy helps them feel less pain, less anxious and more positive because exercise/physical activity helps improve pain and mood perception.

Discussion

This section will begin with a re-statement of the research questions and answers to the research questions will follow. It will end with the study's findings related to the theoretical framework and existing literature in the field.

The Answers to the General Question

The general research question is "How does RSI affect the lives of computer workers and what they do to alleviate its symptoms?" Based on the emerging themes, RSIs affect the lives of the computer workers in the following manner. For several years the RSI-injured computer workers have experienced a wide range of symptoms, such as burning stabbing pain, swelling, numbness, shakiness, clumsiness. These symptoms were felt in their hands/wrists, forearm, elbow, and shoulder. The pain interfered with their office and house work, leisure activities, and sleep at night because they all did repetitive computer tasks for over six hours per day in the last few years. Consequently, all were worried about their future health. However, not all were as worried about their careers or finances. Moreover, they were sad to have weak, clumsy hands that made them prone to accidents, which in turn had an effect on their quality of life.

To alleviate their symptoms the workers were imaginative in developing their own coping strategies. For instance, they became ambidextrous, did self massage, slept with metal braces, went for physiotherapy, pushed the pain it into their subconscious or dismissed it, took drugs, and took time off. In response to their pain, they requested ergonomic assessment, took paid and unpaid time off, and reported the injury to the management or were afraid to report it. Moreover, they all kept physically active at work and at home. Specifically, in the office during working hours they did desk exercises and

at home they did house/yard work as well as participated in leisure activities which helped them cope with the pain. In order to engage in these activities, the RSI-injured computer workers had to develop creative means to be able to do what they used to enjoy prior to their painful work injury (e.g., buying recumbent bikes or power tools).

The Answer to the First Specific Question

The first specific research question is "How does exercise participation help RSI-injured computer workers live with chronic pain and pain-related mental health issues, such as anxiety and depression?" Based on the emerging themes, exercise participation helped the computer workers live with chronic pain and pain-related mental health issues in the following manner. All RSI-injured computer workers were physically active around the house and/or yard (e.g., cooking or painting), participated regularly in leisure activities (e.g., walking/hiking or cross-country skiing) and did exercises (e.g., aqua-fitness, yoga or desk exercises).

Participating in these activities helped to change their pain and mood perception. Specifically, it made them less aware of their pain because they focused their attention on that particular activity which they enjoy, such as walking in the forest. They felt cheerful, de-stressed, and forgot about their pain not only during physical activity participation but also after they participated. As a result, their general outlook became more positive.

The Answers to the Second Specific Question

The second specific research question is "How is exercise prescription used by health professionals to help RSI-injured computer workers live with chronic pain and pain-related mental health issues?" Based on the emerging themes, exercise prescription is

used in the following way by the health professionals to help the RSI-injured computer workers live with chronic pain and pain-related mental health issues. In their practice, the health professional treated patients living with RSIs. They use a variety of approaches (e.g., medication, exercise, holistic, natural) to help their patients cope with the physical and psychological symptoms of pain.

Even if they held different views on the treatment of pain, anxiety and depression, all health professionals embraced similar beliefs regarding exercise prescription. Indeed, they recommended and demonstrate regular exercises, such as stretching and strengthening for physical benefits. In addition, they advocated participation in physical activities (e.g., walking or gardening) because people are meant to move and being physically inactive has negative impact on chronic pain, muscles, anxiety, and depression. The health professionals also instruct their patients to concentrate on what they can do, instead of what they cannot because being physically active has as well psychological benefits. Specifically, during physical activity endorphins are produced in the brain which in turn will contribute to lessen the pain. As a result, patients feel more relaxed and more enthusiastic even after the activity ended.

In summary, from the emerging themes that answered the general and specific research questions, it was found that indeed exercise participation helps computer workers with RSI live with chronic pain and pain related mental health issues, such as anxiety and depression. Explicitly, while engaging in physical activities the RSI-injured computer workers usually became less aware of their pain, at times completely forgetting about it. Furthermore, they felt more upbeat as a result of physical activity participation. They felt this way both during and after participating in physical activities. This was

evidenced by the health professionals who prescribe physical activity participation for the same psychological benefits as the injured workers explained. Particularly, physical activity participation can have long lasting benefits by alleviating pain and mood perception.

Theory and Key findings

This study's theoretical framework brought together strands from the complexity and Yin-Yang theories, and is inspired by the postmodernist paradigm. Complexity theory explains that humans are complex systems and that illnesses can have more than one cause or cure. It gives attention to the whole system with its components interacting rather than focusing on partial components. Consequently, it puts forward a multidisciplinary holistic approach to treating health issues. For example, the pain from RSI can lead to anxiety and depression. Chronic pain, anxiety, and depression are complex health issues and need to be treated using a multidisciplinary holistic approach.

Yin-Yang theory focuses as well on the whole system with its two components interacting rather than Yin and Yang as oppositional components. The Yin-Yang theory gives attention to the balanced interdependence between the Yin-Yang pairings (such as body-mind, health-illness) and emphasizes the importance of their mutual complementary influences. For example, the interdependence and influence among physical pain (e.g., RSI) and psychological pain (e.g., anxiety and depression) which in turn may lead to more pain in the RSI-injured computer workers. Yin and Yang along with body and mind cannot be separated. Consequently, pain and pain-related mental health issues cannot be separated.

Postmodernists also focus on the whole system with its parts interacting and depending on the whole for its existence which include the past (e.g., the work injury sustained by the computer workers), present (e.g., the chronic pain they experience), and future (e.g., the injured workers' worries for their future health and career).

These theoretical foundations allow an approach to work injuries from a unique perspective, one that perceives the human body as being made of components, yet fundamentally connected and balanced. Furthermore, these components are mutually interacting and complementing each other, thus these components cannot be treated in isolation, such as RSIs, pain, anxiety, and depression. In the final analysis, the complexity and Yin-Yang theories were appropriate theories for the conceptual framework used in this study because they allow an understanding both of the physical and the mental aspects of pain and how they interconnect and complement each other. The postmodernist paradigm inspired the study's qualitative methodology. Consequently, it provides insight into the treatment of RSIs as they impact on the physical as well as mental health of the injured workers.

Literature and Key Findings

Vasudevan (1997) writes that injury is followed by pain and it harms individual's physical, psychological, and vocational functions. All health professionals had encountered injured workers whose chronic pain, anxiety and depression prevented them from earning a living, harmed their career, and/or interfered with their normal way of life. In addition, all RSI-injured computer workers expressed sadness because their work injury was followed by chronic pain which interfered with their office work, house/yard work, and leisure activity which in turn has an effect on their quality of life. For instance,

they were upset because due to their work injury they have weak clumsy hands and injured themselves while trying to accomplish their daily activities.

With respect to the *physical aspect of pain*, according to many researcher (Balch and Balch, 2000; Deardorff, 2004; Gilbert et al., 1996; Murphy et. al., 2005; Quilter, 1998; Tjepkema, 2003; Wörz, 2003), medical centers (Beth Israel Medical Center, 2005; Department of Pain Medicine and Palliative Care, 2005), workers groups (Canadian Union of Public Employees, 2003; Workers Health & Safety Centre, 2006), and a government department (Statistics Canada, 2005), pain can cause anxiety and depression which intensifies pain. This was corroborated by all RSI-injured computer workers who explained that they feel worried and distressed because their pain prevents them from doing all the things they used to do before their work injury (e.g., lift a dictionary or use a hammer). Moreover, their daily activities and night's sleep were disrupted by chronic pain. In addition, it was evidenced by the health professionals who insisted that pain and depression go hand in hand, and that anxiety and depression are sometimes caused by chronic pain.

With respect to the *psychological aspect of pain*, according to many researchers (Bailey, 2003; Clydesdale, 2005; Deardorff, 2004; Philips and Rachman, 1996) and a medical center (Mayo Clinic, 2006), inactivity has a negative impact on chronic pain, muscles, anxiety, and depression. This was confirmed by all the health professionals who embraced similar views regarding exercise prescription, most of whom demonstrated exercises to their patients. Because exercise can come in different forms, they recommended, encouraged, and advocated physical activity participation. Accordingly, the health professionals were in agreement with respect to the positive impact of exercise

on physical and mental health in general, and in particular for individuals with chronic pain and pain-related mental health issues, such as anxiety and depression brought on by RSI. The positive impacts of physical activity explained by the health professionals are: decreased of pain, anxiety and depression, as well as increased calmness and happiness (see Philips and Rachman, 1996; Deardorff, 2004; Mayo Clinic, 2006). Moreover, all RSI-injured computer workers recognized the benefits of being physically active. Focusing their attention when working around the house/yard and/or engaging in leisure activities made them less aware of their pain. Additionally, they explained that they felt upbeat and forgot about their pain. However, to accomplish their daily tasks and/or participate in leisure activities, all were creative and started to use both hands or alternate them.

With respect to the *physical benefits of exercise*, according to few researchers (Fishman and Berger, 2001; Murphy et al., 2006; Merck Manual of Medical Information, 2004), medical center (Arthritis Society, 2004; Mayo Clinic, 2005 & 2006; National Institute of Neurological Disorders and Stroke, 2006), and a union (Public Service Alliance of Canada, 2003), exercise confers the following physical benefits: stretches and strengthens muscles and as a result muscles become stronger; increases flexibility and as a result joints will move with less pain; increase energy level which will help to cope with the pain; and helps prevent relapses. As seen, this was validated by the RSI-injured computer workers who were physically active around the house/yard and in their office because they noticed physical activity helped them cope with the pain. In addition, to avoid the disuse syndrome which increases pain, the health professionals demonstrated exercises and encouraged their patients to participate in physical activities.

With respect to the *psychological benefits of exercise*, during exercise endorphins are produced in the brain. Endorphins decrease pain and increase pleasure (Fishman and Berger, 2001; Laskowski, 2005; National Institute of Neurological Disorders and Stroke, 2006; and Vickers-Douglas, 2006). Endorphins also help alleviate anxiety and depression (European Food Information Council, 2005; Mayo Clinic, 2005; and Vickers-Douglas, 2006). According to the European Food Information Council (2005), Skrinar (2003), and Vickers-Douglas (2006) exercise confers the following psychological benefits: self-confidence, distraction by focusing on the surroundings, interaction with others, and reduction of recurring depression. Consequently, regular exercise is not only a weapon to combat pain, but also a tool to address pain-related mental health issues. From the interviews with the RSI-injured computer workers and health professionals it can be concluded that the same is applicable to individuals with RSIs suffering from pain and pain-related health issues, such as anxiety and depression. Furthermore, they all stated that they forget the pain when engaging in physical activity, are districted by the enjoyable activity they focus on, feel better about themselves, and remain happy even after the activity ended.

In short, the findings of this study support the general literature on pain. Namely, the pain from an injury can lead to anxiety and depression, and exercise/physical activity helps in general patients live with pain and pain-related mental-health issues. Furthermore, the findings demonstrated that participating in exercise/physical activity as well helps in particular RSI-injured computer workers live with chronic pain and pain-related mental health issues, such as anxiety and depression. Additionally, the health professionals prescribe exercise/physical activity for the same benefits. Precisely,

focusing on the activity that patients enjoy it helps them improve their pain and mood perception.

Conclusions

This study revealed that work injuries, such as RSIs, do not only have an impact on the physical health of the injured workers, but also on their mental health. It examined the manner in which physical pain as a result of injuries sustained in the workplace affects individuals as a whole, leading to the development of psychological injury, such as anxiety and depression. Since workplace injuries can happen to anyone, it is important to understand and address workplace injuries, such as RSIs. Consequently, when examining them, the physical as well as the mental aspect of the work injuries should be taken into consideration.

Therefore, this study explores the use of exercise/physical activity as an approach to help computer workers with RSIs live with chronic pain and pain-related mental health issues, such as anxiety and depression. What is important about this study is that the specific literature on RSIs does not make a strong case for the specific use of exercise/physical activity for addressing pain related mental health issues. Hence, it can be concluded, warranted from the results of this study, both the RSI-injured computer workers and health professionals feel that exercise/physical activity helps computer workers with RSIs live with chronic pain and pain-related mental health issues, such as anxiety and depression.

The foremost consequence of RSIs is pain which interferes with daily activities and night's sleep. Pain can result in anxiety and depression. At times anxiety causes pain (when anxious individuals tighten their muscles) and depression similarly causes pain

(when depressed individuals are inactive and inactivity has a negative impact on chronic pain and muscles). In view of that, exercise/physical activity confers physical and psychological benefits. Accordingly, exercise/physical activity can have a positive effect on the perception of pain by reducing anxiety and depression which in turn may alleviate feelings of pain in RSI-injured computer workers. Indeed, when explaining their experience of pain, their tone was distressed and their facial expression sad. However, when describing their feelings during and after participating in exercise/physical activity their tone brightened and they exhibited a happy expression.

The general literature on pain, specific literature on RSIs, and interviews conducted with RSI-injured computer workers and health professionals presented a link between chronic pain and pain-related mental health issues, such as anxiety and depression. The interviews conducted with both groups agreed with the general literature on pain. Namely, being physically active has a positive impact on the perception of pain, anxiety and depression. However, the specific literature on RSIs did not make reference of the positive impact of exercise/physical activity on RSI-injured computer workers. Consequently, this study suggests that exercise/physical activity can be viewed as part of a more holistic approach to help RSI-injured computer workers live with pain-related mental health issues, not merely for alleviating pain itself.

In closing, this study will help fill the gap in the literature on possible treatment options for RSI-injured computer workers. Second, it will help health professionals who treat both the physical and mental aspects of RSIs, which in turn will help reduce time lost due to the injury. Third, the improved understanding of the benefits of exercise/physical activity on the perception of chronic pain and pain-related mental

health issues in RSI-injured computer workers will provide the foundation for more effective treatment options, ameliorate their recovery, facilitate their return into the workforce, and enhance their overall quality of life.

Implications

The results of this study can be used to help injured workers gain insight into their condition and ways of addressing it, as well as to help health professionals in treating both the physical and mental aspects of RSIs. This may also contribute to reducing time lost due to injuries, and thereby help employees, employers, and insurance companies. In addition, the present study attempted to fill the gap in the literature on white collar work related injuries in the public service. Furthermore, both the RSI-injured computer workers and the health professionals believe that exercise/physical activity helps alleviate chronic pain, anxiety and depression. Consequently, with improved understanding of the therapeutic effects of exercise/physical activity on chronic pain and pain-related mental health issues in computer workers, it should be possible to develop a holistic approach to enable individuals living with RSIs better cope with it, return to work and re-integrate into the community earlier.

Additionally, there is a need for heightening awareness of RSIs along with their physical and psychological consequences. Through recruitment of the participants for both samples, this study brought awareness to the community at large, in the workplace, and in the medical community.

The literature specific to RSIs does not make as strong a reference to the use of exercise for treating chronic pain and pain related mental health issues as does the general literature on chronic pain. Therefore, this study emphasizes a holistic approach to

understanding and addressing RSIs, as well as the use of exercise/physical activity to help computer workers with RSIs live with chronic pain and pain-related mental health issues, such as anxiety and depression.

Limitations of the Study

Locke et al. (2000) and Lu (2004) agree that every study has its limitations and delimitations. Berg and Latin (2004) state that studies cannot control all factors, and as a result, even the best studies have to deal with limitations. In this light, the present study has its own delimitations and limitations.

The small sample size, a total of 16 participants, limits the ability to draw generalizable conclusions about RSI-injured computer workers and health professionals treating this type of work injury. However, with respect to sample size in qualitative research, Punch (1998) states that usually samples are small, as well Berg and Latin (2004) indicate that some common limitations are the small number of participants. With respect to the small sample size used in qualitative research Rubin and Rubin (2005) recommend the researcher not apologize for interviewing "*only* 10 people," but explain "why you picked" them and "what experiences" (p. 253) they lived to make them important for a particular study. One of the present samples comprised eight RSI-injured computer workers who use computers and live with RSI. Hence, participants were selected for their subjective, personal experience of RSI, pain, anxiety, depression, and exercise therapy. The second sample included eight health professionals who treat RSI-injured computer workers. Thus, they were selected for their professional, medical knowledge of RSI, pain, anxiety, depression, and their views on the benefits of exercise/physical activity for RSI sufferers.

Nevertheless, it is recognized that in this study the two samples were small and not representative of all RSI-injured computer workers and health professionals. Given that only eight RSI-injured computer workers and only eight health professionals treating chronic pain, anxiety and depression were interviewed, the results of this study cannot be generalized to the entire population of RSI-injured computer workers from the public service and health professionals treating chronic pain. In addition, if a different sample of eight RSI-injured computer workers (e.g., from the private sector) and a different sample of eight health professionals treating chronic pain (e.g., general practitioners, occupational therapists) would have been interviewed, it is possible that their responses could have been different. Furthermore, if the samples would have been larger, or from a different city, or from a rural area, it is possible that their responses could have also been different.

Another limitation anticipated in this study concerned asking computer workers to explain how their pain interferes with their daily activities and sleep at night, and to share their worries about their future career and health without appearing to be complainers and/or weak. Some of them were a bit hesitant to respond to such questions and became more open after the recorder was turned off. Furthermore, the participants in both samples were aware of the research topic from the recruitment text (the effects of exercise on chronic pain and pain-related mental health issues) and could have been biased in their responses with respect to physical activity participation and/or exercise prescription. Indeed, the computer workers may have over-estimated their physical activity participation and the health professionals may have over-emphasized their exercise prescription.

A further limitation might result from the samples being recruited during the summer months when most workers and health professionals are away on vacation. Furthermore, due to the summer vacations organizations are short of staff and the remaining staff has heavy workloads. Consequently, a number of organizations and individuals, even if they showed interest in the study, declined to participate because they did not have time. Thus, one way to improve this study would be avoiding recruiting the participants during the summer months.

In addition, it is possible that the RSI-injured computer workers who volunteered to participate in this study were more outspoken about their work injury. Perhaps having post-secondary education made them more confident in expressing themselves. As well, it is possible that the health professionals who volunteered were more open to a holistic approach to treat chronic pain and pain-related mental health issues. Perhaps being younger made them more open to new ways of treatment.

Moreover, when using NVivo to code the interviews, the researcher of this study may have had individual biases since she herself lives with an RSI. If the researcher would have not been an RSI-injured computer worker, she may have not fully appreciated how chronic pain interferes with daily activities and sleep at night. Perhaps the NVivo tree nodes would have been differently coded.

Furthermore, this study focused on RSIs caused only by computer work in the public service (not RSI caused by other white collar or blue collar work) and on health professionals treating chronic pain and pain-related mental health caused only by RSI (not chronic pain caused by, for example, road injuries).

Future Research

The present study focused exclusively on RSI-injured computer workers in the federal government. Initial future research should be a continuation of this qualitative approach to examining RSI-injured workers but with different groups of workers. For example, RSI-injured computer workers in the private sector, or even industrial workers suffering from repetitive strain injuries. Indeed, extensive personal histories of RSI sufferers could be undertaken in order to provide further in-depth, qualitative data on how people cope with pain related mental health issues. As well, some supporting quantitative measures could be employed within such an experiential approach so as to facilitate triangulation of findings.

Berg and Latin (2004) claim that experimentation is a powerful means of generating new information. For instance, in order to study the effect of exercise/physical activity on chronic pain and pain-related mental health in RSI-injured computer workers, a one-group pretest-post test design might be used. In this way, the effects of manipulating the independent variable (e.g., exercise/physical activity) on depended variables (e.g., perception of chronic pain, anxiety, and depression) could be determined. Furthermore, it could be ascertained whether a cause-and-effect relationship exists between regular exercise/ physical activity and the RSI-injured computer workers' perception of chronic pain, anxiety, and depression.

According to Kidder and Judd (1986) survey researchers look at people who "are representative of the populations to which they wish to generalize" (p. 131). In addition, they explain that "the strength of survey research lies in answering questions of fact and in assessing the distributions of the characteristics of populations" (Kidder and Judd,

1986, p. 141). Furthermore, Neuman (2003) argues that "Surveys are appropriate for research questions about self-reported belief or behaviors" (p. 264). In this light, a suggestion for future research would be to conduct a survey that would look at the practices, behaviors, and opinions of health professionals with respect to treating RSI-injured computer workers suffering from chronic pain, anxiety and depression. This would permit the making of generalizations to the population of health professionals who treat chronic pain and pain-related mental health issues. A large scale survey of health professionals could investigate their self-reported beliefs and practices related to helping computer workers with RSIs cope with chronic pain and pain-related mental health issues.

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APPENDIX A

Bob Chiarelli

Mayor / Maire
City of Ottawa / Ville d'Ottawa

Repetitive Strain Injury Awareness Day

February 28, 2006

WHEREAS, Repetitive Strain Injury (RSI) is an umbrella term for a number of overuse injuries affecting the soft tissues (muscles, tendons and nerves) of the neck, upper and lower back, chest, shoulders, arms and hands, and is caused by a variety of factors including repetition, force and awkward or static postures; and

WHEREAS, RSI is a significant occupational health concern affecting nearly 2.3 million Canadians. Despite its increasing prevalence, RSI is poorly understood by workers, employers and the medical profession; and

WHEREAS, early intervention is key to preventing these injuries, which typically begin as aches and pains progressing to permanent disorders preventing those who suffer with RSI from working or leading normal lives;

THEREFORE, I, Bob Chiarelli, Mayor of the City of Ottawa, do hereby proclaim **February 28, 2006 as Repetitive Strain Injury Awareness Day in the City of Ottawa.**

Journée de sensibilisation aux microtraumatismes répétés

Le 28 février 2006

ATTENDU QUE l'expression microtraumatismes répétés est un terme générique employé pour décrire un certain nombre de blessures d'accumulation qui touchent les tissus mous (les muscles, les tendons et les nerfs) du cou, du haut et du bas du dos, de la poitrine, des épaules, des bras et des mains et sont causées par divers facteurs, y compris la répétition, la force et les postures inconfortables ou statiques; et

ATTENDU QUE les microtraumatismes répétés constituent un problème important de santé au travail qui touche près de 2,3 millions de Canadiens, et que malgré leur prévalence croissante, ces blessures sont très peu comprises par les travailleurs, les employeurs et la profession médicale; et

ATTENDU QU'UNE intervention précoce est essentielle pour prévenir ces blessures, qui commencent habituellement par des douleurs puis se transforment graduellement en des troubles permanents, empêchant ainsi ceux qui en souffrent de travailler ou de mener une vie normale;

PAR CONSÉQUENT, je, Bob Chiarelli, maire d'Ottawa, proclame par la présente le **28 février 2006, Journée de sensibilisation aux microtraumatismes répétés à Ottawa.**

Bob Chiarelli
Mayor / Maire

110 Laurier Avenue West
Ottawa, ON K1P 1J1

110, avenue Laurier ouest
Ottawa (ON) K1P 1J1
Tél. : (613) 580-2509

APPENDIX B

(1967)

TABLE 3. SOCIAL READJUSTMENT RATING SCALE

Rank	Life event	Mean value
1	Death of spouse	100
2	Divorce	73
3	Marital separation	65
4	Jail term	63
5	Death of close family member	63
6	Personal injury or illness	53
7	Marriage	50
8	Fired at work	47
9	Marital reconciliation	45
10	Retirement	45
11	Change in health of family member	44
12	Pregnancy	40
13	Sex difficulties	39
14	Gain of new family member	39
15	Business readjustment	39
16	Change in financial state	38
17	Death of close friend	37
18	Change to different line of work	36
19	Change in number of arguments with spouse	35
20	Mortgage over $10,000	31
21	Foreclosure of mortgage or loan	30
22	Change in responsibilities at work	29
23	Son or daughter leaving home	29
24	Trouble with in-laws	29
25	Outstanding personal achievement	28
26	Wife begin or stop work	26
27	Begin or end school	26
28	Change in living conditions	25
29	Revision of personal habits	24
30	Trouble with boss	23
31	Change in work hours or conditions	20
32	Change in residence	20
33	Change in schools	20
34	Change in recreation	19
35	Change in church activities	19
36	Change in social activities	18
37	Mortgage or loan less than $10,000	17
38	Change in sleeping habits	16
39	Change in number of family get-togethers	15
40	Change in eating habits	15
41	Vacation	13
42	Christmas	12
43	Minor violations of the law	11

those indicative of the life style of the individual, and those indicative of occurrences involving the individual. Evolving mostly from ordinary, but some from extraordinary, social and interpersonal transactions, these events pertain to major areas of dynamic significance in the social structure of the American way of life. These include family constellation, marriage, occupation, economics, residence, group and peer relationships, education, religion, recreation and health.

During the developmental phase of this research the interview technique was used to assess the meaning of the events for the individual. As expected, the psychological significance and emotions varied widely with the patient. Also it will be noted that

APPENDIX C

Table 2.

Understanding the nature, function, and side effects of pain medication

Category	Function	Examples	Side effects
Peripherally acting	Analgesic Reduces inflammation	ASA, NSAID, acetaminophen, Corticosteroid injections	Abdominal pain, nausea, liver & kidney damage if long term use It cannot be repeated, hypertension, weight gain, cataracts
Centrally acting	Analgesic, narcotics,	Demerol, Oxicodone, Tylenol 3, 4	Constipation, nausea, vomiting, decreased lung function, dizziness, light headedness, depression, **addictive**
Adjuvant	Analgesic, sedatives, anti-anxiety	Diazepam, Lorazepam	Drowsiness, lethargy, sexual problems (decreased desire, impaired ejaculation, vaginal dryness), require gradual withdrawal, **addictive**
Antidepressant	Depression, chronic pain	TCA (Elavil, Tofranil), SSRI (Prozac, Paxil, Celexa), SNRI (Effexor), NDRI (Welbutrin),*	Worsening of asthma, heart/liver/kidney disease, weight gain, lethargy, constipation/diarrhea, nausea, tremor, drowsiness, dizziness, hypertension, sexual problems (decreased desire, impaired ejaculation, vaginal dryness), caution driving
Muscular relaxant	Muscle relaxant	Robaxisal	Headache, dizziness, drowsiness, difficulty with concentration, **short-term basis**
Specific pain	Analgesic	Prophylactic (use daily as prevention of migraine) & symptomatic (episodic use)	Nausea, weight gain, dizziness, drowsiness, anxiety, depression, muscular cramps/pain/weakness, reported fatalities with high doses

*TCA: trycyclic antidepressants
SSRI: selective serotonin reuptake inhibitors
SNRI: serotonin and norepinephrine reuptake
NDRI: norepinephrine and dopamine

APPENDIX D

Interview Guide
RSI-Injured computer workers

How does exercise help computer workers with RSI's live with chronic pain and pain-related mental health issues (anxiety and depression)?

Gender: M_____ F_____

Age: 30-40___41-50___51-65___

Education: _____

Occupation/What do you do for work: _____

1. I want to know a bit about your experience with this pain. Do you remember when the pain started?
-about how long have you had this pain

2. How often do you experience pain, during the day when working and/or during the night interfering with your sleep => fatigue
-how would you describe your pain

3. Tell me, do you worry, do you fell scared, concerned about your future? Did the pain change your life?
- health => pain may get worse with time
- career => you may need to change your job
- finances => if unable to work and finished your sick leave => go on disability leave

4. Do you feel sad, negative, discouraged that you can not do what you used to do before because of the pain and/or weak/clumsy hands?
- house and office work

5. What do you do about your pain:
-did you mention to: doctor, physio, OHS, union, manager
- medication: topical, oral, over the counter, prescription
- physio, posture, music,
- pain specialist CBT – gate control model – mental exercise
-do you wear elastic wrist band, metal brace -day, night

6. Do you participate in regular physical activities (walking, exercise, gardening, biking, skating, skiing, swimming, hiking)? If so, did you notice an overall increase in fitness / energy if you exercise?
-how often do you exercise?
-for how long do you exercise?
- desk exercises: at least 2/day

7. Does the level of your pain change after participating in these activities?
-is it the same, or increases, or decreases

8. How do you feel after participating in these physical activities?
-cheerful, positive, stress-free, forget or stop thinking about the pain

9. Is there anything else you would like to tell me about your experience with pain?

APPENDIX E

Interview Guide
Health professionals

How does exercise help computer workers with RSI's live with chronic pain and pain-related mental health issues (anxiety and depression)?

Gender: M_____ F_____

Age: 30-40___41-50___51-65___

Occupation: _____

1. What approach do you use to treat patients with chronic pain and pain related mental health issues (anxiety and depression) caused by RSI
   - -medication: topical, oral, over the counter, prescription
   - -physio, posture, music,
   - -pain specialist CBT – gate control (mental exercise)
   - -exercise, walking, gardening, (physical exercise)
   - -desk exercise

2. Do you have any patients whose chronic pain, anxiety and depression:
a) prevent them from earning a living – sick/disability leave)
b) harm their career - promotion, sick/disability leave
c) interfere with their normal way of life – recreation: skiing, weeding, social, house

=> during moments of despair did they tell you that they feel like losing their mind from being in constant pain

3. As a health professional what do chronic pain, anxiety and depression mean for you?

4. As a health professional what do you see as strengths or weaknesses in the treatment of chronic pain, anxiety and depression?

5. How would you feel if you were a patient experiencing pain day and night along with anxiety and depression?

6. As a patient what treatment would you like to get to help you live with your chronic pain along with anxiety and depression?
-keeping in mind the side effects from drug therapy

7. Is there anything else you would like to tell me about the treatment of chronic pain and pain-related mental health issues?

APPENDIX F

Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

RECRUITMENT TEXT TO PARTICIPANTS
(to be used for both samples)

Dear Madam/Sir,

I am Nicoleta Woinarosky, a public service employee on leave doing my Master's at the University of Ottawa, Faculty of Health Sciences, School of Human Kinetics. I am supervised by Dr. Don Dawson, Associate Professor, University of Ottawa, Faculty of Health Sciences, School of Human Kinetics.

My M.A. thesis' title is "A Holistic Approach to Treating White Collar Injuries: The Effect of Exercise on Chronic Pain and Pain-Related Mental Health Issues, In Computer Workers with Repetitive Strain Injuries". For my thesis I would like to interview eight public service employees with RSI's (e.g. data entry, researchers, and managers). I would also like to interview eight health professionals (e.g. doctors, rehabilitation specialists, and occupational health therapists).

I would like to ask the health professionals some questions about RSI's and their approaches to treating patients. Similarly, I plan to ask the RSI injured workers questions about their experience with pain, treatments and coping mechanisms. The interview will be conducted in English and will last approximately one hour.

I was wondering if you would be willing to be interviewed for this study. I am also wondering if you could be of assistance in identifying other health professionals or workers to be interviewed for this research by forwarding to them my email. I would appreciate any assistance you can provide.

Your participation in this study is voluntary. If you decide to participate, you may withdraw from the study at any time for any reason. If you agree to participate, I will ask you to read and sign a consent form.

If you have any questions regarding the ethical conduct of this study, you may contact Protocol Officer for Ethics in Research, University of Ottawa, at ethics@uottawa.ca, (613) 562-5841. For questions regarding the general nature of this study you may contact the undersigned or Dr. Dawson at ddawson@uottawa.ca, (613) 562-5800 ext. 4264.

Thank you,

Nicoleta Woinarosky,
M. A. Student
University of Ottawa, Faculty of Health Sciences, School of Human Kinetics
Email:

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Ottawa (Ontario) K1N 6N5 Canada

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Ottawa, Ontario K1N 6N5 Canada

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Université d'Ottawa • University of Ottawa
Faculté des sciences de la santé
École des sciences de l'activité physique
Faculty of Health Sciences
School of Human Kinetics

Lettre de recrutement de participants
(pour les deux échantillons)

Monsieur, Madame,

Je me présente, Nicoleta Woinarosky, employée de la fonction publique en congé et étudiante à la maîtrise à l'Université d'Ottawa, Faculté des sciences de la santé, École des sciences de l'activité physique. Je suis supervisée par P[r] Don Dawson, professeur agrégé, Université d'Ottawa, Faculté des sciences de la santé, École des sciences de l'activité physique.

Ma thèse de maîtrise s'intitule « Une approche holistique au traitement des traumatismes de cols blancs : Effet de l'exercice sur la douleur chronique et les problèmes de santé mentale reliés à la douleur, chez les travailleurs utilisant l'ordinateur et souffrant du syndrome de tension répétée ». Pour ma thèse, j'aimerais interroger huit employés de la fonction publique souffrant du syndrome de tension répétée (STR) (par exemple, préposés à l'entrée de données, chercheurs et gestionnaires). J'aimerais aussi interroger huit professionnels de la santé (par exemple, médecins, spécialistes en réadaptation et thérapeutes en santé au travail).

J'aimerais poser aux professionnels de la santé des questions sur le STR et leurs approches de traitement. De même, je projette de poser à des travailleurs souffrant du STR des questions sur leur expérience de la douleur, des traitements et des mécanismes d'adaptation. L'entrevue sera en anglais et d'une durée approximative d'une heure.

Est-ce que vous accepteriez d'être interrogé pour mon étude? Accepteriez-vous aussi de m'aider à identifier d'autres professionnels de la santé ou des travailleurs que je pourrais interroger pour cette recherche en leur transmettant ce courriel. J'apprécierais toute aide que vous pourriez m'apporter.

Votre participation à cette étude est volontaire. Si vous décidez de participer, vous pourrez vous retirer de l'étude à tout moment et pour toute raison. Si vous acceptez de participer, je vous demanderai de lire et de signer un formulaire de consentement.

Pour toutes questions sur les enjeux éthiques en cause vous pouvez communiquer avec le responsable de l'éthique en recherche de l'Université d'Ottawa (ethics@uottawa.ca, 613-562-5841). Pour toutes questions sur l'étude en général vous pouvez communiquer avec la sous-signée ou avec le P[r] Dawson (ddawson@uottawa.ca 613-562-5800 poste 4264).

Merci.

Nicoleta Woinarosky, Étudiante à la maîtrise
Université d'Ottawa, Faculté des sciences de la santé, École des sciences de l'activité physique
Courriel :

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APPENDIX G

Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé | Faculty of Health Sciences
École des sciences de l'activité physique | School of Human Kinetics

CONSENT FORM
(for computer workers with RSI)

TITLE OF THE STUDY:
A Holistic Approach to Treating White Collar Injuries: The Effect of Exercise on Chronic Pain and Pain-Related Mental Health Issues, In Computer Workers with Repetitive Strain Injuries.

INVESTIGATOR:
Nicoleta Woinarosky, M.A. Student
University of Ottawa, Faculty of Health Sciences, School of Human Kinetics
Email:

SUPERVISOR:
Dr. Don Dawson, Associate Professor
University of Ottawa, Faculty of Health Sciences, School of Human Kinetics
Email: ddawson@uottawa.ca

INVITATION TO PARTICIPATE:
I, _____, agree to participate in the above-mentioned research study conducted by Ms. Nicoleta Woinarosky, M. A. student who is supervised by Dr. Dawson.

PURPOSE OF THE STUDY:
The purpose of this study is to demonstrate how exercise helps computer workers suffering from repetitive strain injuries (RSI's), live with chronic pain and pain-related mental health issues, such as anxiety and depression.

ELIGIBILITY:
To be able to participate in this study, I must be between the ages of 30-65, must be proficient in English, and suffer from pain caused by RSI.

PARTICIPATION:
I will be asked to participate in a face-to-face interview, conducted in English, of approximately one hour that will be tape-recorded. The interview location and time will be at my convenience and comfort (e.g. my office or the researcher's; during lunch time or after work hours).

RISKS:
There are no known risks or inconveniences, whether emotional, psychological, physical, social or economic, as a result of my participation in this research. I understand that I can refuse to answer any questions that I feel uncomfortable answering.

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BENEFITS:
With improved understanding of the therapeutic effects of exercise on chronic pain and pain-related mental health issues, it should be possible to develop better approaches that enable injured workers living with RSI's to return to work and re-integrate into the community earlier. In addition, this research will contribute to the advancement of knowledge providing a new holistic approach to understanding and treating RSI's, and the use of exercise as an alternative and/or adjuvant treatment regimen to help computer workers with RSI's live with chronic pain and pain-related mental health issues.

CONFIDENTIALITY AND CONSERVATION OF DATA:
All results and data (tape-recordings and transcripts) will be kept in a locked filing cabinet in the office of the supervisor Dr. Dawson at the University of Ottawa for a period of 5 years post-publication after which they will be destroyed.

ANONYMITY:
I will not be identified in any reports or publications. I may be quoted, but I will not be identified in any way. A pseudonym will be used.

VOLUNTARY PARTICIPATION:

My participation in this study is voluntary. If I choose to participate, I can withdraw from the study at any time. If I withdraw from the study, the data gathered from me until the time of withdrawal will be destroyed.

If I have any questions with regard to the ethical conduct of the project, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room159, Ottawa, ON, K1N 6N5, (613) 562-5841 (telephone) or ethics@uottawa.ca (email). There are two copies of this consent form one of which is for me to keep.

CONSENT:
I agree to participate in this research study.

Participant's name: (Please print) _____

Email:_____ tel.:_____

Participant's signature: _____ Date: _____

Researcher's signature:_____ Date:_____

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École des sciences de l'activité physique
Faculty of Health Sciences
School of Human Kinetics

Formulaire de consentement
(pour les travailleurs utilisant l'ordinateur et souffrant du STR)

TITRE DE L'ÉTUDE :
Une approche holistique au traitement des traumatismes de cols blancs : Effet de l'exercice sur la douleur chronique et les problèmes de santé mentale reliés à la douleur, chez les travailleurs utilisant l'ordinateur et souffrant du syndrome de tension répétée

CHERCHEUSE :
Nicoleta Woinarosky, étudiante à la maîtrise
Université d'Ottawa, Faculté des sciences de la santé, École des sciences de l'activité physique
Courriel

SUPERVISEUR :
P[r] Don Dawson, professeur agrégé
Université d'Ottawa, Faculté des sciences de la santé, École des sciences de l'activité physique
Courriel : ddawson@uottawa.ca

INVITATION À PARTICIPER :
Je, _____, accepte de participer à l'étude de recherche mentionnée ci-dessus et dirigée par M[me] Nicoleta Woinarosky, étudiante à la maîtrise supervisée par le P[r] Dawson.

BUT DE L'ÉTUDE :
Le but de cette étude est de démontrer de quelle façon l'exercice aide les travailleurs utilisant l'ordinateur et souffrant du syndrome de tension répétée (STR) à vivre avec une douleur chronique et avec des problèmes de santé mentale reliés à la douleur comme l'anxiété et la dépression.

ADMISSIBILITÉ :
Pour pouvoir participer à cette étude, je dois avoir entre 30 et 65 ans, maîtriser l'anglais et souffrir de douleur causée par le STR;

PARTICIPATION :
On me demandera de participer à une entrevue individuelle, en en anglais et d'une durée approximative d'une heure qui sera enregistrée. L'entrevue aura lieu à l'endroit et au moment qui me conviennent (par exemple, à mon bureau ou à celui de la chercheuse; à l'heure du dîner ou après les heures de travail).

RISQUES :
Le fait de participer à cette recherche ne comporte ni risques ni inconvénients connus, qu'ils soient émotifs, psychologiques, physiques, sociaux ou économiques. Je reconnais que je peux refuser de répondre à toutes questions qui me mettraient mal à l'aise.

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AVANTAGES :
Une meilleure compréhension des effets thérapeutiques de l'exercice sur la douleur chronique et les problèmes de santé mentale reliés à la douleur devrait rendre possible l'élaboration de meilleures approches permettant aux travailleurs souffrant du STR de retourner au travail et de réintégrer leur milieu plus rapidement. En outre, cette recherche contribuera à l'avancement du savoir par une nouvelle approche holistique pour la compréhension et le traitement du STR, et par le recours à l'exercice comme solution et/ou régime de traitement adjuvant visant à aider les travailleurs utilisant l'ordinateur et souffrant du STR à vivre avec la douleur chronique et avec des problèmes de santé mentale reliés à la douleur.

CONFIDENTIALITÉ ET CONSERVATION DES DONNÉES :
Tous les résultats et données (enregistrements et transcriptions) seront conservés dans un classeur fermé à clé dans le bureau du superviseur le P[r] Dawson à l'Université d'Ottawa pendant une période de cinq ans après la publication, à la suite de quoi ils seront détruits.

ANONYMAT :
Je ne serai pas identifié dans quelque rapport ou publication que ce soit. Il est possible que je sois cité, mais je ne serai pas identifié de quelque façon que ce soit. Un pseudonyme sera utilisé.

PARTICIPATION VOLONTAIRE :

Ma participation à cette étude est volontaire. Si je décide de participer, je pourrai me retirer de l'étude à tout moment. Si je me retire de l'étude, les données recueillies jusqu'au moment de mon retrait seront détruites.

Si j'ai des questions sur la conduite éthique du projet, je peux communiquer avec le responsable de l'éthique en recherche, par la poste : Université d'Ottawa, Pavillon Tabaret, 550, rue Cumberland, pièce 159, Ottawa, ON; par téléphone : 613-562-5841; par courriel : ethics@uottawa.ca. Ce formulaire de consentement est fait en deux copies, dont une m'est destinée.

CONSENTEMENT :

J'accepte de participer à cette étude de recherche.

Nom du participant : (lettres moulées) _____

Courriel : _____ Tél. : _____

Signature du participant : _____ Date : _____

Signature de la chercheuse : _____ Date : _____

APPENDIX H

Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

CONSENT FORM
(for health professionals treating computer workers with RSI)

TITLE OF THE STUDY:
A Holistic Approach to Treating White Collar Injuries: The Effect of Exercise on Chronic Pain and Pain-Related Mental Health Issues, In Computer Workers with Repetitive Strain Injuries.

INVESTIGATOR:
Nicoleta Woinarosky, M.A. Student
University of Ottawa, Faculty of Health Sciences, School of Human Kinetics
Email:

SUPERVISOR:
Dr. Don Dawson, Associate Professor
University of Ottawa, Faculty of Health Sciences, School of Human Kinetics
Email: ddawson@uottawa.ca

INVITATION:
I, _____, agree to participate in the above-mentioned research study conducted Ms. Nicoleta Woinarosky, M. A. student who is supervised by Dr. Dawson.

PURPOSE OF THE STUDY:
The purpose of this study is to demonstrate how exercise helps computer workers suffering from repetitive strain injuries (RSI's), live with chronic pain and pain-related mental health issues, such as anxiety and depression.

ELIGIBILITY:
To be able to participate in this study, I must be between the ages of 30-65, must be proficient in English, and treat computer workers suffering from chronic pain and pain-related mental health issues, such as anxiety and depression caused by RSI.

PARTICIPATION:
I will be asked to participate in a face-to-face interview, conducted in English, of approximately one hour that will be tape-recorded. The interview location and time will be at my convenience and comfort (e.g. my office or the researcher's; during lunch time or after work hours).

RISKS:
There are no known risks or inconveniences, whether emotional, psychological, physical, social or economic, as a result of my participation in this research. I understand that I can refuse to answer any questions that I feel uncomfortable answering.

125 rue Université C.P. 450, Succ. A
Ottawa (Ontario) K1N 6N5 Canada

125 University St., P.O. Box 450, Stn A
Ottawa, Ontario K1N 6N5 Canada

(613) 562-5800 • Télec Fax: (613) 562-5149

BENEFITS:
With improved understanding of the therapeutic effects of exercise on chronic pain and pain-related mental health issues, it should be possible to develop better approaches that enable injured workers living with RSI's to return to work and re-integrate into the community earlier. In addition, this research will contribute to the advancement of knowledge providing a new holistic approach to understanding and treating RSI's, and the use of exercise as an alternative and/or adjuvant treatment regimen to help computer workers with RSI's live with chronic pain and pain-related mental health issues.

CONFIDENTIALITY AND CONSERVATION OF DATA:
All results and data (tape-recordings and transcripts) will be kept in a locked filing cabinet in the office of the supervisor Dr. Dawson at the University of Ottawa for a period of 5 years post-publication after which they will be destroyed.

ANONYMITY:
I will not be identified in any reports or publications. I may be quoted, but I will not be identified in any way. A pseudonym will be used.

VOLUNTARY PARTICIPATION:

My participation in this study is voluntary. If I choose to participate, I can withdraw from the study at any time. If I withdraw from the study, the data gathered from me until the time of withdrawal will be destroyed.

If I have any questions with regard to the ethical conduct of the project, I may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room159, Ottawa, ON, K1N 6N5, (613) 562-5841 (telephone) or ethics@uottawa.ca (email). There are two copies of this consent form one of which is for me to keep.

CONSENT:
I agree to participate in this research study.

Participant's name: (Please print) _____

Email:_____ tel.:_____

Participant's signature: _____ Date: _____

Researcher's signature:_____ Date:_____

Université d'Ottawa • University of Ottawa
Faculté des sciences de la santé
École des sciences de l'activité physique
Faculty of Health Sciences
School of Human Kinetics

Formulaire de consentement
(pour les professionnels de la santé traitant des travailleurs utilisant l'ordinateur et souffrant du STR)

TITRE DE L'ÉTUDE :
Une approche holistique au traitement des traumatismes de cols blancs : Effet de l'exercice sur la douleur chronique et les problèmes de santé mentale reliés à la douleur, chez les travailleurs utilisant l'ordinateur et souffrant du syndrome de tension répétée

CHERCHEUSE :
Nicoleta Woinarosky, étudiante à la maîtrise
Université d'Ottawa, Faculté des sciences de la santé, École des sciences de l'activité physique
Courriel :

SUPERVISEUR :
P^r Don Dawson, professeur agrégé
Université d'Ottawa, Faculté des sciences de la santé, École des sciences de l'activité physique
Courriel : ddawson@uottawa.ca

INVITATION À PARTICIPER :
Je, _____, accepte de participer à l'étude de recherche mentionnée ci-dessus et dirigée par M^me Nicoleta Woinarosky, étudiante à la maîtrise supervisée par le P^r Lu.

BUT DE L'ÉTUDE :
Le but de cette étude est de démontrer de quelle façon l'exercice aide les travailleurs utilisant l'ordinateur et souffrant du syndrome de tension répétée (STR) à vivre avec une douleur chronique et avec des problèmes de santé mentale reliés à la douleur comme l'anxiété et la dépression.

ADMISSIBILITÉ :
Pour pouvoir participer à cette étude, je dois avoir entre 30 et 65 ans, maîtriser l'anglais et traiter des travailleurs utilisant l'ordinateur et souffrant de douleur chronique et de problèmes de santé mentale reliés à la douleur chronique comme l'anxiété et la dépression causés par le STR.

PARTICIPATION :
On me demandera de participer à une entrevue individuelle, en anglais et d'une durée approximative d'une heure qui sera enregistrée. L'entrevue aura lieu à l'endroit et au moment qui me conviennent (par exemple, à mon bureau ou à celui de la chercheuse; à l'heure du dîner ou après les heures de travail).

RISQUES :
Le fait de participer à cette recherche ne comporte ni risques ni inconvénients connus, qu'ils soient émotifs, psychologiques, physiques, sociaux ou économiques. Je reconnais que je peux refuser de répondre à toutes questions qui me mettraient mal à l'aise.

125 rue Université C.P. 450, Succ. A
Ottawa (Ontario) K1N 6N5 Canada
125 University St., P.O. Box 450, Stn A
Ottawa, Ontario K1N 6N5 Canada

(613) 562-5800 • Téléc/Fax: (613) 562-5149

AVANTAGES :
Une meilleure compréhension des effets thérapeutiques de l'exercice sur la douleur chronique et les problèmes de santé mentale reliés à la douleur devrait rendre possible l'élaboration de meilleures approches permettant aux travailleurs souffrant du STR de retourner au travail et de réintégrer leur milieu plus rapidement. En outre, cette recherche contribuera à l'avancement du savoir par une nouvelle approche holistique pour la compréhension et le traitement du STR, et par le recours à l'exercice comme solution et/ou régime de traitement adjuvant visant à aider les travailleurs utilisant l'ordinateur et souffrant du STR à vivre avec la douleur chronique et avec des problèmes de santé mentale reliés à la douleur.

CONFIDENTIALITÉ ET CONSERVATION DES DONNÉES :
Tous les résultats et données (enregistrements et transcriptions) seront conservés dans un classeur fermé à clé dans le bureau du superviseur le P[r] Lu à l'Université d'Ottawa pendant une période de cinq ans après la publication, à la suite de quoi ils seront détruits.

ANONYMAT :
Je ne serai pas identifié dans quelque rapport ou publication que ce soit. Il est possible que je sois cité, mais je ne serai pas identifié de quelque façon que ce soit. Un pseudonyme sera utilisé.

PARTICIPATION VOLONTAIRE :

Ma participation à cette étude est volontaire. Si je décide de participer, je pourrai me retirer de l'étude à tout moment. Si je me retire de l'étude, les données recueillies jusqu'au moment de mon retrait seront détruites.

Si j'ai des questions sur la conduite éthique du projet, je peux communiquer avec le responsable de l'éthique en recherche, par la poste : Université d'Ottawa, Pavillon Tabaret, 550, rue Cumberland, pièce 159, Ottawa, ON; K1N 6N5, par téléphone : 613-562-5841; par courriel : ethics@uottawa.ca. Ce formulaire de consentement est fait en deux copies, dont une m'est destinée.

CONSENTEMENT :
J'accepte de participer à cette étude de recherche :

Nom du participant : (lettres moulées) _____

Courriel : _____ Tél. : _____

Signature du participant : _____ Date : _____

Signature de la chercheuse : _____ Date : _____

APPENDIX I .

Table 3

Socio–demographic characteristics of the computer workers

Gender	Number	Age	Number	Education	Number	Occupation	Number
Females	5	30 – 40	1	College	3	Senior Analyst	1
Males	3	41 – 50	5	Bachelor's	3	Senior Policy Analyst	1
		51 – 65	2	Master's	2	Chief Standards, Analysis & Monitoring	1
						Importation & Business Services Agent	1
						Policy Analyst	1
						French Writer/Editor	1
						Information Technology Officer	1
						Programmer/Analyst	1

APPENDIX J

Table 4

Socio–demographic characteristics of the health professionals

Gender	Number	Age	Number	Occupation	Number
Females	4	29	4	Naturopathic Doctor	2
Males	4	30 – 40	2	Certified Athletic Therapist	1
		41 – 50	1	Doctor of Chiropractic	1
		51 – 65	1	Registered Massage Therapist	1
				Doctor of Acupuncture & Doctor of Natural Medicine	1
				Physiatrist, medical doctor specialized in chronic pain	2

APPENDIX K

Université d'Ottawa University of Ottawa
Service de subventions de recherche et déontologie | Research Grants and Ethics Services

HEALTH SCIENCES AND SCIENCE RESEARCH ETHICS BOARD

CERTIFICATE OF ETHICAL APPROVAL

This is to certify that the University of Ottawa Health Sciences and Science Research Ethics Board has examined the application for ethical approval of the research project entitled **A Holistic Approach to Treating White Collar Injuries: The Effect of Exercise on Chronic Pain and Pain-Related Mental Health Issues, in Computer Workers with Repetitive Strain Injuries (file H 06-06-07)** submitted by Nicoleta Woinarosky and supervised by Don Dawson of the School of Human Kinetics. The Board found that this research project met appropriate ethical standards as outlined in the Tri-Council Policy Statement and in the Procedures of the University of Ottawa Research Ethics Boards, and accordingly gave it a Category 1a (approval). This certification is valid one year from the date indicated below.

Rita D'Alessandro
Protocol Officer for Ethics in Research
For Dr. Daniel Lagarec, Chair of the
Health Sciences and Science REB

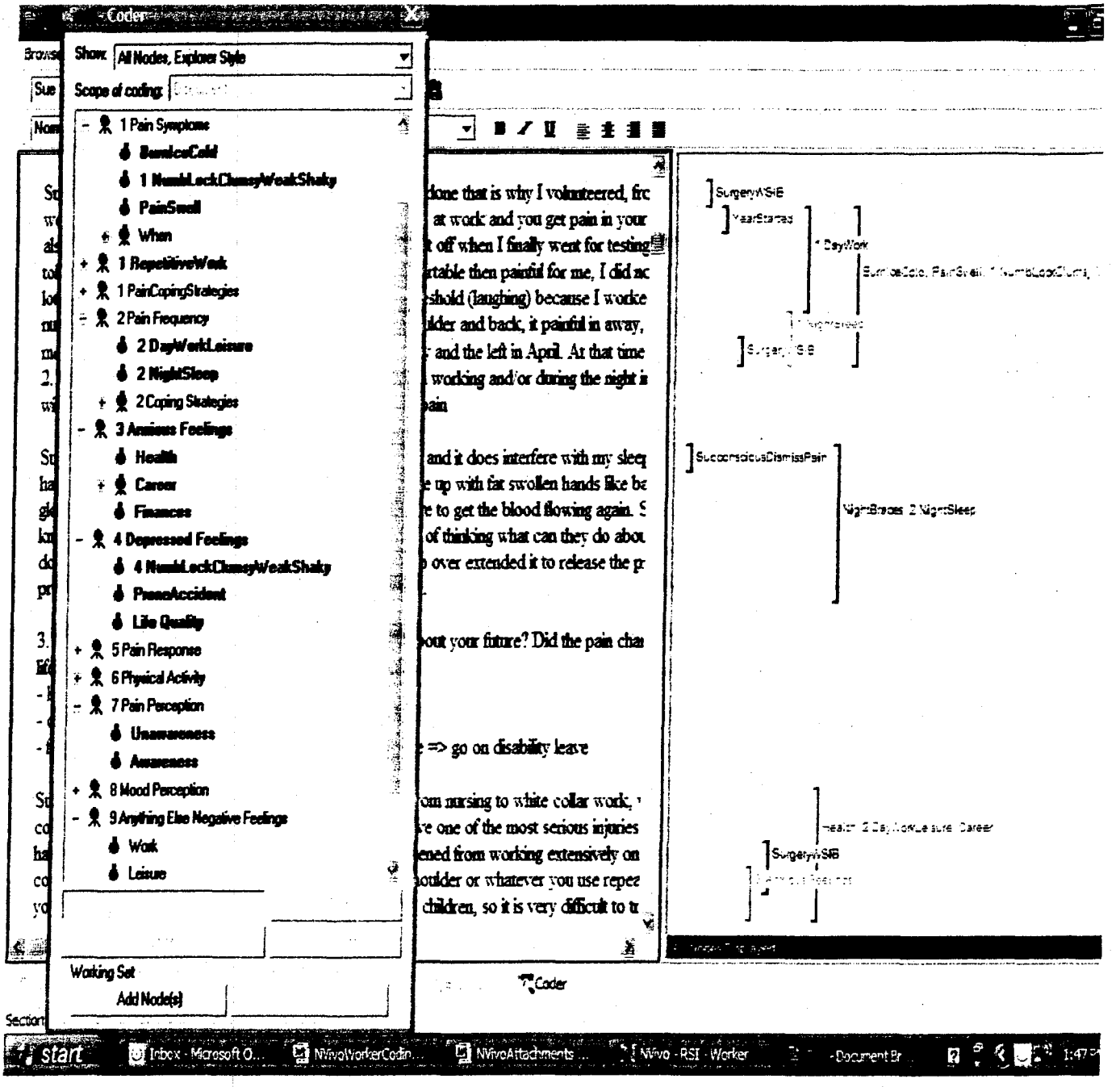
August 14, 2006
Date

550, rue Cumberland 550 Cumberland Street
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada
(613) 562-5841 • Téléc. Fax (613) 562-5338
http://www.uottawa.ca/services/research/ge/index.html

APPENDIX L

Tree Nodes for Computer Workers

NVivo document in Document Browser mode. Coder and Coding Stripes are tuned On



APPENDIX M

Tree Nodes for Health Professionals

NVivo document in Document Browser mode. Coder and Coding Stripes are tuned On