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THE IMPACT OF PHYSICAL EXERCISE ON OPERATIONAL STRESS INJURIES (OSIS)

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JCSP 39

Master of Defence Studies

PCEMI 39

Maîtrise en études de la défense

Canada

CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES
JCSP 39 – PCEMI 39
2012 – 2013

MASTER OF DEFENCE STUDIES – MAÎTRISE EN ÉTUDES DE LA DÉFENSE

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Word Count: 15 022

Compte de mots: 15 022

ABSTRACT

There are a significant number of Canadian Armed Forces (CAF) members that suffer from Operational Stress Injuries (OSIs). Since the CAF puts members in harm's way, contributing to the development of OSIs, it has a moral obligation to protect them both physically and psychologically. As such, the CAF spends considerable resources to create the conditions and ensure the physical and psychological health of its members. The purpose of this thesis is to show that there is significant evidence that physical exercise can be beneficial when used as an adjunct to treatment for OSIs in the CAF.

This paper provides a historical overview of OSIs and defines the three main types: depression, Post-Traumatic Stress Disorder (PTSD) and anxiety, in relationship to soldiers that deploy on operational missions. It focuses on the psychological benefits of physical exercise and provides a rationale as to why physical exercise should be used as a compliment to current treatment methods for OSIs.

Although not the norm within treatment methodologies within the CAF, this research paper demonstrates that physical exercise can have a positive impact on depression, PTSD and anxiety. The utilization of such a physical exercise-mental health paradigm needs heightened awareness within the CAF and should be considered as a legitimate adjunct to Operational Stress Injury (OSI) treatment.

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LIST OF ABBREVIATIONS

ADF	Australian Defence Force (ADF)
BICEPS	Brevity, Immediacy, Centrality or Contact, Expectancy, Proximity, and Simplicity
CAF	Canadian Armed Forces
CBT	Cognitive Behavioural Therapy
CFHS	Canadian Forces Health Services
DSM IV	Diagnostic and Statistical Manual of Mental Disorders IV
GAD	General Anxiety Disorder
JPSU	Joint Personnel Support Unit
MDD	Major Depressive Disorder
OSI	Operational Stress Injury
OSIs	Operational Stress Injuries
OTSSC	Operational Trauma and Stress Support Centres
PIES	Proximity, Immediacy, Expectancy, Simplicity
PSP	Personnel Support Program
PTSD	Post Traumatic Stress Disorder
UK	United Kingdom
US	United States
VAC	Veteran's Affairs Canada
WWI	World War I
WWII	World War II

ACKNOWLEDGEMENTS

I would like to thank my thesis advisor, Dr. Don McCreary, for all his guidance, meticulous feedback, and numerous phone discussions, thereby ensuring that I was on the right path throughout my research paper. I would also like to thank LCol Marc Bilodeau, Jennifer Peters, Megan Leslie, Dr Alexander Kolodziej, LCol Suzanne Bailey, and Maj Paul Sedge for providing me with research material and direction for my paper. Finally, I would like to thank my wife, Alison Kerry, for her patience and acting as my sounding board when I wasn't sure which direction to take with my paper.

INTRODUCTION

Operational Stress Injuries (OSIs) have been a significant problem with soldiers for as long as we have been fighting wars.

> *Doctors with fighting units have been describing what we'd call the psychological effects of soldiering ever since the dawn of modern medicine in Europe. The first medical paper on the subject was published in 1678. Its author observed anxiety, depression, disturbed sleep and insomnia severe enough to lead, when not dealt with, to madness or mysterious death. It was only the vast scale of the First World War, however, which forced medical establishments to confront the treatment and rehabilitation of operational stress injuries. Doctors have been engaged with the issues ever since*.[1]

Although not always diagnosed as such, common symptoms such as depression, Post Traumatic Stress Disorder (PTSD), and unprovoked hostility, which are associated with an Operational Stress Injury (OSI), have been prevalent in previous wars with recorded history. "From antiquity onwards, chroniclers, sensitive to unusual behavior in their heroes, reported isolated cases of agitation or stupor sometimes associated with terrifying nightmares."[2]

The Canadian Armed Forces (CAF) uses the term OSIs as the overarching acronym that covers the range of anguish that soldiers incur from operational deployments. "The term OSIs is used to describe a broad range of problems which

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[1]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

[2]Philippe Birmes, Leah Hatton, Alain Brunet and Laurent Schmitt, "Early Historical Literature for Post-Traumatic Symptomology," *Stress and Health* 19, no. 1 (Feb 2003): 18.

usually result in impairment in functioning."[3] OSIs "include conditions such as anxiety, depression and PTSD as well as a range of less severe conditions …"[4] The CAF delineates the various disorders related to OSIs as "any persistent psychological difficulty resulting from operational duties performed by a Canadian Forces member."[5]

OSIs, especially PTSD, have become a well-known topic within the media since the CAF increased its combat role in Afghanistan. Headlines such as "Veteran shot dead by B.C. police treated for PTSD … sister says he had stress syndrome since at least 2009,"[6] and "PTSD tearing up armed forces base, soldiers, families say,"[7] are just a couple of news articles that demonstrate that OSIs such as depression, PTSD, and anxiety are prevalent and have a considerable strain on soldiers returning from operational deployments.

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[3]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

[4]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

[5]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

[6]The Canadian Press, "Veteran shot dead by B.C. police treated for PTSD - Greg Matters' sister says he had stress syndrome since at least 2009," *The Canadian Press*, [article on-line]; available from http://www.cbc.ca/news/canada/british-columbia/story/2012/09/13/bc-man-shot-by-police-ptsd.html; Internet; accessed 10 Sep 12.

[7]Tim Baines, "PTSD Tearing up Armed Forces Base, Soldiers, Families Say," *The Sun News*, [article on-line]; available from http://www.sunnewsnetwork.ca/sunnews/canada/archives/2012/05/20120518-175526.html ; Internet; accessed, 10 Sep 2012.

It is estimated within the CAF that approximately eight per-cent (8%) of persons returning from Afghanistan are diagnosed with PTSD.[8] Many of those diagnosed with PTSD have a co-morbid diagnosis such as depression or anxiety.[9] Many soldiers return to their full-time job, some remain in the CF with modifications to their job and "some are medically released and transitioned to Veterans Affairs Canada (VAC)."[10] Many of the military members that do return to duties engage various coping mechanisms to help them to function more effectively at their work, home and in social settings. Some of these coping mechanisms can be negative, such as alcohol and drug use, while others are adaptive, such as counselling, group therapy, family therapy, medication and physical exercise to augment their recovery.

There are many treatment methodologies used to deal with the various symptoms of OSI. Some of the psychological treatments include Cognitive Behavioral Therapies (CBT), which try to break the cycle of traumatic thoughts and assist individuals by encouraging them to provide a written account of the traumatic event(s) "… designed to elicit the natural emotion experienced during the trauma."[11] Other forms of treatment include group therapy, which attempts to humanize the experience; and family therapy,

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[8]Department of National Defence, *Cumulative Incidence of Post-Traumatic Stress Disorder (PTSD) and Other Mental Disorders in Canadian Forces Personnel Deployed in Support of the Mission in Afghanistan, 2001-2008* , [report on-line]; available from http://forces.gc.ca/health-sante/ps/mh-sm/osi-bso/sum-som-eng.asp; Internet; accessed 10 Sep 12.

[9]*Ibid.*

[10]*Ibid.*

[11]*Ibid.*

which attempts to focus not just on the individual but on his/her network of support as well as desensitization therapy exercises.

Some research states that physical activity and exercise can have significant reductions in OSI-type symptoms.[12] Physical activity is defined as any type of motion that requires some form of muscular exertion beyond a sedentary state, whereas, exercise is defined "as a subset of physical activity that is planned, structured, repetitive, and purposeful in the sense that improvement or maintenance of physical fitness is the objective."[13] "Both physical activity and exercise contribute to improving psychological mental health states."[14] Since both are beneficial and a lot of the research varies on whether they examine physical activity, exercise or both, the term 'physical exercise' will be used to report findings for both, using the terms interchangeably. Improving physical well-being may lead to improved psychological well-being and it is generally accepted that physical exercise has positive effects on mood and anxiety.[15] Based on research evidence, physical exercise appears to be a useful treatment for depression, compared

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[12]Theresa A. Manger and Robert W. Motta, "The Impact of an Exercise Program on Posttraumatic Stress Disorder, Anxiety, and Depression," *International Journal of Emergency Mental Health* 7, no. 1 (Winter 2005): 49.

[13]Paul D. Thompson, David Buchner, Ileana L. Piña, Gary J. Balady, Mark A. Williams, Bess H. Marcus, Kathy Berra, Steven N. Blair, Fernando Costa, Barry Franklin, Gerald F. Fletcher, Neil F. Gordon, Russell R. Pate, Beatriz L. Rodriguez, Antronette K. Yancey, and Nanette K. Wenger, "Exercise and Physical Activity in the Prevention and Treatment of Atherosclerotic Cardiovascular Disease," *Journal of the American Heart Association* 107, (2003): 3109.

[14]Frank J. Penedo and Jason R. Dahn, "Exercise and Well-Being: A Review of Mental and Physical Health Benefits Associated with Physical Activity," *Current Opinion in Psychiatry* 18, no. 2 (2005): 189.

[15]Andreas Strohle, "Physical Activity, Exercise, Depression and Anxiety Disorders," *Journal of Neural Transmission* 116, no. 6 (June 2009): 778.

with medication, psychotherapy, and possibly cognitive therapy, "however in the latter case more data is required for a more reliable determination to be made."[16] However, other literature shows inconclusive findings regarding the impact of physical exercise on improving OSI symptoms, primarily due to methodological research issues.

Overall, this paper will show that there is currently significant and growing evidence that physical exercise can be a beneficial adjunct to treatment for OSIs within the CAF. Chapter One will first provide a historical review of OSIs and then define the main three types of OSIs (depression, PTSD and anxiety) in relationship to soldiers that deploy on operational missions. Chapter Two will focus on the psychological benefits of physical exercise which will include a review of the literature on the impact of physical exercise on OSIs. Chapter Three will discuss whether physical exercise should be used as a compliment to treatment methods for OSIs. In Chapter Four, the paper will discuss the implications within the CAF culture for using physical exercise as a treatment for OSIs. Finally, Chapter Five will provide a summary of the paper.

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[16]James Swan and Philip Hyland, "A Review of the Beneficial Mental Health Effects of Exercise and Recommendations for Future Research," *Psychology & Society* 5, no.1 (2012): 6.

CHAPTER 1 – OPERATIONAL STRESS INJURIES (OSIs)

The topic of OSIs within the military is quite broad; therefore, this chapter will first provide some historical context and a general overview of OSIs which have been referred to by many different terms throughout history. The chapter will then focus on the most prominent OSIs that are referred to throughout this paper, specifically depression, PTSD and anxiety. This section will provide a definition for each OSI, some statistics on the prevalence of each disorder among soldiers that have deployed and treatment methods utilized within the CAF.

HISTORY OF OSIs

"Traumatic stress symptoms have been described since man first began recollecting past catastrophes and waging war."[17] A chronicle of various events throughout history provides us with a sense that OSIs are not a new or recent phenomenon. For instance, during ancient times there were often literary references to the trauma experienced when faced with violent death, and other feelings of despair on witnessing disturbing events of another soldier being defeated in war.[18]

"The first medical paper on the subject was published in 1678."[19] The author of the paper "observed anxiety, depression, disturbed sleep and insomnia severe enough to

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[17]Philippe Birmes, Leah Hatton, Alain Brunet and Laurent Schmitt, "Early Historical Literature for Post-Traumatic Symptomology," *Stress and Health* 19, no. 1 (Feb 2003): 18.

[18]*Ibid*., 18.

[19]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

lead, when not dealt with, to madness or mysterious death."[20] Further mention of OSIs has been documented throughout the 17th and 18th centuries as well. For example, "in the 17th century, Descartes remarked in his research on *The Passions of the Soul* that events causing fear can affect human behavior long after their occurrence (Tomb, 1994)."[21,22] This citing makes reference to the recurring traumatic thoughts that are associated with PTSD and will be further defined later in this chapter.

"Gradually, medical doctors became more aware of psychic post-traumatic injuries."[23] During the Napoleonic Wars (1803-1815), and the American Civil War (1861-1865), there was further development of the psychology field and categorization and chronicling of conditions associated with OSIs. During the Napoleonic Wars, soldiers experienced something referred to as 'cerebro-spinal shock', which involved tingling and paralysis after they had been "close to the passage of a projectile or its explosion but had not suffered a physical wound."[24] Terms such as 'hysteria' and

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[20]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

[21]R. Descartes, (1989) *Les passions de l'ame. (The passions of the soul)* (Indianapolis: Hackett Publishing Co. 126-127.

[22]David A. Tomb, "The Phenomenology of Post-Traumatic Stress Disorder," *Psychiatric Clinics of North America* 17, no. 2 (1994): 238.

[23]Philippe Birmes, Leah Hatton, Alain Brunet and Laurent Schmitt, "Early Historical Literature for Post-Traumatic Symptomology," *Stress and Health* 19, no. 1 (Feb 2003): 18.

[24]Edgar Jones and Simon Wessely, *Shell Shock to PTSD, Military Psychiatry from 1900 to the Gulf War* (New York: Psychology Press, 2005), 2.

'neurasthenia' were used to refer to symptoms during the 1800s that are similar to those of present day PTSD.[25]

However, it was not until World War I (WWI) that disorders associated with OSIs, such as anxiety and depression, really became prominent and further discussion on the treatment and understanding of various disorders was brought to the forefront of psychological research. The study of combat stress in WWI led to an innovative understanding of traumatic stress disorders and new ideologies around prevention and treatment.[26] Initially, during World War I, the term 'shell shock', was used to describe OSI-type symptoms, which were incurred due to the traumatic effects of war. For example, "soldiers exhibited stupor, irritability, trembling, traumatic dreams, exaggerated startle …"[27] The shell shock theory implied that soldiers were predisposed, and had a low capacity to react to the traumas of war; further symptoms outlined in the theory were a paralysis of the nervous system and mind.[28] Initially during WWI, medical staff did not know how to respond to such symptoms, as seen in the following passage.

> . . . medical officers at the front, from their ignorance and inexperience, were unable to differentially diagnose the different psychical disabilities incurred, and even more unfit to treat them. Men were punished, even

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[25]Susan L. Ray, "Evolution of Post-traumatic Stress Disorder and Future Directions," *Archives of Psychiatric Nursing* 22, no.4 (August 2008): 218.

[26]Lars Weisaeth, "The European History of Psychotraumatology," *Journal of Traumatic Stress* 15, no. 6, (December 2002): 443.

[27]Philippe Birmes, Leah Hatton, Alain Brunet and Laurent Schmitt, "Early Historical Literature for Post-Traumatic Symptomology," *Stress and Health* 19, no. 1 (Feb 2003): 23.

[28]Philippe Birmes, Leah Hatton, Alain Brunet and Laurent Schmitt, "Early Historical Literature for Post-Traumatic Symptomology," *Stress and Health* 19, no. 1 (Feb 2003): 23.

> shot (though not by us) for such disabilities as if they were crimes.[29]

With increased onset, and the fact that personnel exhibiting such symptoms were incapable of fighting a war, affected soldiers were subsequently removed from the trenches and medically evacuated to another location for treatment. The impact this had on the fighting force during WWI can be seen in the following quote. "The number affected continued to increase, and it quickly became a huge problem in all armies - in some areas nervous disorders accounted for 40% of the casualties."[30] OSI-type symptoms continued to affect soldiers in WWI and during large battles it had a major impact on the fighting force. For example, "from July to December 1916, more than 16,000 cases of shell shock were recorded among the British battle casualties, …"[31]

This period was really a pivotal time for the pioneering of treatment methods regarding depression, PTSD and anxiety as the influx of symptoms among soldiers forced medical personnel to devise a method of treatment. It was during this period of history that nervous disorders in war were officially recognized.[32]

The method of treatment known as 'forward psychiatry' was unique to this period of time as seen in the following reference. "A system of clearing stations near to the front

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[29]J.W. Springthorpe in J. Damousi, *Freud in the Antipodes: A Cultural History of Psychoanalysis in Australia* (Sydney: University of NSW Press, 2005), quoted in Ruth Rae, "A Historical Account of Shell Shock During the First World War and Reforms in Mental Health in Australia 1914–1939," *International Journal of Mental Health Nursing 16 (2007):* 266.

[30]Peter Howorth, "The Treatment of Shell Shock," *Psychiatric Bulletin* 24 (2000): 225.

[31]Lars Weisaeth, "The European History of Psychotraumatology," *Journal of Traumatic Stress* 15, no. 6, (December 2002): 446.

[32]Peter Howorth, "The Treatment of Shell Shock," *Psychiatric Bulletin* 24 (2000): 226.

line was set up with only those men who failed to recover within two weeks being sent back to England."[33] The current day acronym, known as PIES, which stands for Proximity, Immediacy, Expectancy and Simplicity, is also known in other current day practices as BICEPS, meaning, Brevity, Immediacy, Centrality or Contact, Expectancy, Proximity, and Simplicity.[34] Both terms refer to the requirement of treating soldiers immediately and close to the front. The ideology during WWI was that that if a soldier could be treated near to the front line instead of repatriation back to England, this would subsequently expedite his return to the front lines. Furthermore, reintegration with his unit could provide the requisite support and monitoring of subsequent issues that would enable the soldiers to remain at the front. If a soldier was repatriated away from the theater of war it was unlikely that he would return to battle which caused a large impact on the fighting force.

Some of the treatment ideologies of this period, which still hold true in many instances today, are based on the following principles. First, that "prompt treatment be given soon after the traumatic event" and in close situ to the front line would be more effective than repatriating a soldier with little hope of him returning.[35] Second, "the necessity to re-experience and/or go over the events" in order to humanize the experience and for the soldier to acknowledge the event.[36] This also enabled the soldier to talk about

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[33]Peter Howorth, "The Treatment of Shell Shock," *Psychiatric Bulletin* 24 (2000): 226.

[34]US Department of the Army, *Combat Stress: Field Manual 6-22.5* (Washington, DC: Department of Defense, 2000), Appendix B Glossary.

[35]Peter Howorth, "The Treatment of Shell Shock," *Psychiatric Bulletin* 24 (2000): 226.

[36]Peter Howorth, "The Treatment of Shell Shock," *Psychiatric Bulletin* 24 (2000): 226.

the event in order to give it meaning and not live in silence, which could worsen the condition. A third principle was cognitive restructuring, which enabled the soldier to overcome the cycle of recurring negative thoughts of the traumatic experience. The fourth principle, a collaborative effort between the soldier and medical care provider, is the 'therapeutic alliance,' a venue for the soldier to discuss the event. Finally, through the collaborative approach, the soldier was able to identify the event and realize the "importance of the previous experience in determining whether and in what way a person might break down."[37] This enabled the individual to understand the symptoms and devise coping mechanisms to deal with re-occurring negative thoughts in the event of subsequent traumatic event(s).

The groundwork for the treatment of OSI symptoms was really set during WWI and re-established during WWII, although, initially during WWII, there was a reversion back to the somewhat archaic ways of dealing with OSIs. It appeared that the lessons learned during WWI were not immediately implemented during WWII. Terms such as 'lack of moral fiber' were used "… which has its origins in World War II, when it was used to stigmatize air crew who had lost the will to fight."[38] However, as WWII developed, combat related symptoms were referred to as "combat neurosis" and "operational fatigue."[39] During the latter part of the Second World War, OSI-type symptoms were referred to as 'combat exhaustion' and it was during this time that there

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[37]Peter Howorth, "The Treatment of Shell Shock," *Psychiatric Bulletin* 24 (2000): 226.

[38]Edgar Jones and Simon Wessely, *Shell Shock to PTSD, Military Psychiatry from 1900 to the Gulf War* (New York: Psychology Press, 2005), 1255.

[39]Bradley D. Grinage, "Diagnosis and Management of Post-traumatic Stress Disorder," *American Family Physician*, 15, no.12 (Dec 2003): 2401.

was a focus on unit cohesion, and what we would term resilience training today, whereby the requirement for 'unit cohesion' would offset the difficulties that soldiers would incur during the traumatic experiences of war. Many significant advances were devised during this time such as prompt treatment close to the battle front and specific treatment practices such as cognitive restructuring which had a lasting impact for subsequent wars.

During the "Korean War, psychiatric casualties were recorded at 37" per 1,000, while during the Vietnam War; psychiatric casualties [referred to as stress response syndrome] were relatively low at 12 per 1,000.[40] The prevalence of psychiatric disorders in modern day wars is also apparent. For example, in a sample taken from 11,000 US Gulf War I soldiers, from1995-1997, the prevalence of PTSD was approximately 10.1%.[41] In Gulf War II, 6.2% of veterans returning from war were diagnosed with PTSD.[42]

The next section will take a closer look at the modern definition of OSIs, specifically depression, PTSD and anxiety as well as the prevalence in soldiers deploying on present-day operational deployments and discuss current practices for treating these disorders.

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[40]Dean, E.T., *Shook Over Hell, Post Traumatic Stress, Vietnam and the Civil War* (Cambridge Mass: Harvard University Press, 1997), quoted in Edgar Jones and Simon Wessely, "Psychiatric Battle Casualties: An Intra- and Interwar Comparison," *British Journal of Psychiatry* 178, no. 3 (2001): 245.

[41]Han K. Kang, Benjamin H. Natelson, Clare M. Mahan, Kyung Y. Lee, and Frances M. Murphy, "Post-Traumatic Stress Disorder and Chronic Fatigue Syndrome-Like Illness Among Gulf War Veterans: A Population-based Survey of 30,000 Veterans," *American Journal of Epidemiology* 157, no. 2 (2003): 145.

[42]Rosemary Toomey, Han K. Kang, Joel Karlinsky, Dewleen G Baker, Jennifer J, Vasterling, Renee Alpern, Domenic J. Reda, William G. Henderson, Frances M. Murphy and Seth A. Eisen, "Mental health of US Gulf War Veterans 10 Years After the War," *The British Journal of Psychiatry* 105, no.1 (2007): 389.

OVERVIEW OF OSIs

Soldiers are susceptible to OSIs (i.e., depression, PTSD and anxiety) from situations that they incurred while on operational deployments and often symptoms from these disorders become more obvious upon their return from a mission. Typical OSI signs seem to surface after the deployment in "the form of recurrent memories, daydreams, nightmares, or flashbacks that cause the individual to relive the trauma."[43] Other symptoms include hyper-alertness, sleep difficulties and things like a smell or sound can "unexpectedly remind them of the event, they may act erratically in trying to avoid painful triggers."[44]

Shocking events, such as witnessing the death of a friend in combat, witnessing the death of a civilian casualty, being threatened with a weapon, working in a war zone hospital during an operational deployment can have varying impacts on an individual. Generally, approximately 15% of soldiers deployed to combat zones will suffer from an OSI.[45] The soldiers that are affected "cannot express their emotions clearly: even they themselves may not recognize that something is wrong."[46]

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[43]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

[44]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

[45]Jean Rodrigue Paré, "Post-Traumatic Stress Disorder and the Mental Health of Military Personnel and Veterans," *Library of Parliament* (14 October 2011) [background paper on-line]; available from http://www.parl.gc.ca/Content/LOP/ResearchPublications/2011-97-e.pdf; Internet; accessed 18 Jul 13.

[46]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

However, not everyone reacts in the same manner to a traumatic event. For example, research on civilians that incur loss or experience a traumatic event show that the majority of personnel have no adverse reaction; some have an initial reaction with improvement and recovery within a short time span and "some people [10-15%] experience acute distress from which they are unable to recover."[47] It is also important to note that although soldiers may be susceptible to a mental health illness, because of the nature of their job, the majority of personnel will not develop an OSI. Based on civilian findings, "large numbers of people manage to endure the temporary upheaval of loss or potentially traumatic events remarkably well, with no apparent disruption in their ability to function …"[48]

Many factors can contribute to the risk of incurring an OSI such as the type of the deployment (peacekeeping versus combat mission), prevalence of witnessing traumatic events, lack of work-related and personal support network upon return from a mission, and breaking apart units by posting members to geographically diverse locations upon their return.[49]

The term OSI is a non-clinical term and used in this paper to refer specifically to clinical terms such as depression, PTSD and anxiety. As depicted in Figure 1.1 below, often these disorders are 'co-morbid', defined as the "simultaneous presence of two

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[47] George A. Bonanno, "Loss, Trauma, and Human Resilience - Have We Underestimated the Human Capacity to Thrive After Extremely Aversive Events?" *American Psychologist,* (January 2004): 20,23.

[48]George A. Bonanno, "Loss, Trauma, and Human Resilience - Have We Underestimated the Human Capacity to Thrive After Extremely Aversive Events?" *American Psychologist,* (January 2004): 20.

[49]Operational Stress Injury Social Support (OSSIS), http://www.osiss.ca/engraph/def_e.asp?sidecat=1; Internet; accessed 18 Jan 13.

chronic diseases or conditions" in a soldier.[50] For example, "in veterans with a diagnosis of chronic military related PTSD; about 50% also experience symptoms of co-morbid Major Depressive Disorder (MDD) at some point in their lives."[51]

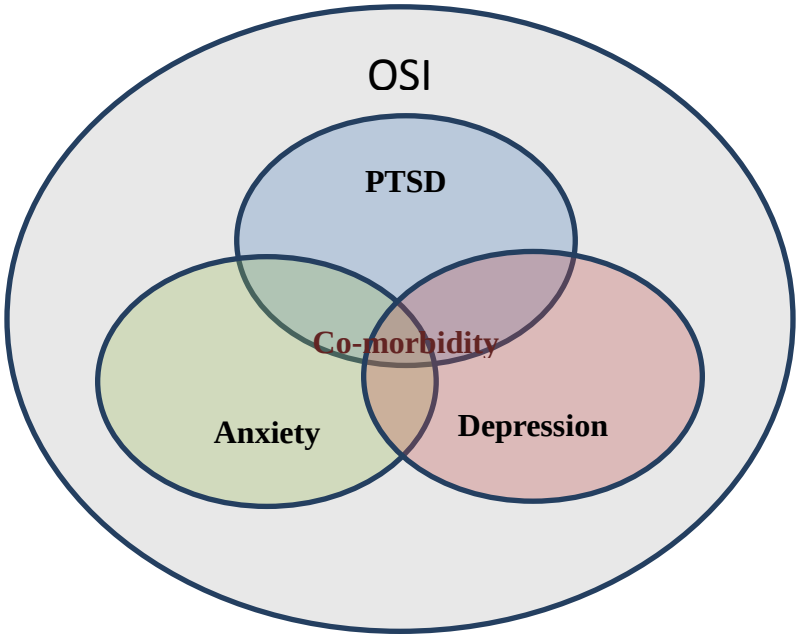

Figure 1.1 - Co-morbidity of Operational Stress Injuries (OSIs)

In order to provide an understanding of OSIs, the chapter will now define depression, PTSD and anxiety, state the prevalence of the disorder occurrence in soldiers that deploy on operational missions and provide an overview of treatment mechanisms used to overcome or cope with the symptoms.

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[50]Oxford Dictionary, http://oxforddictionaries.com/us/definition/ english/comorbidity; Internet; accessed 18 Jan 13.

[51]Don J. Richardson, Alexandra M McIntyre Smith, David Haslam, John D Elhai, and Jitender Sareen, "Examining the Association Between Psychiatric Illness and Suicidal Ideation in a Sample of Treatment-Seeking Canadian Peacekeeping and Combat Veterans With Posttraumatic Stress Disorder," *Canadian Journal of Psychiatry* 57, no. 8 (2012): 497.

DEPRESSION DEFINED

"It has been estimated that by the year 2020, depression will be the second leading cause of disability throughout the world, trailing only ischemic heart disease."[52] There is increased risk of suicide if depression is not treated. According to the World Health Organization, depression can lead to suicide, resulting in approximately 1 million yearly deaths.[53]

Depression has a number of features. The Diagnostic and Statistical Manual of Mental Disorders (DSM IV), which is used by mental health professionals to classify mental disorders, defines depression as a mood disorder that "is characterized by reduced mood, sadness, and lost enthusiasm for previously interesting activities in daily life."[54] Other factors such as weight loss, disturbed sleeping patterns, muscle weakness, inability to concentrate and sense of worthlessness are all symptoms of depression.[55] "A MDD is characterized by one or more major depressive episodes (i.e. at least 2 weeks of depressed mood or loss of interest accompanied by at least four additional symptoms of

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[52]C.D. Mathers, T. Vos, A.D. Lopez, J. Salomon J, and M. Ezzati, *National Burden of Disease Studies: APractical Guide Edition 2.0, Global Program on Evidence for Health Policy*, (Geneva: World Health Organization, 2001), quoted in Centers for Disease Control and Prevention, *Mental Health Basics*, [website on-line]; available from http://www.cdc.gov/mentalhealth/basics.htm; Internet; accessed 18 Jan 13.

[53]World Health Organization, "Mental Health," http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/; Internet; accessed 18 Jan 13.

[54]American Psychiatric Association, *Quick Reference to the Diagnostic Criteria from DSM-IV-TR* (Arlington, West Virginia: American Psychiatric Association Inc., 2000), 168-169.

[55]American Psychiatric Association, *Quick Reference to the Diagnostic Criteria from DSM-IV-TR* (Arlington, West Virginia: American Psychiatric Association Inc., 2000), 168-169.

depression).”[56] The symptoms include changes in appetite or weight loss, sleep problems, psychomotor activity, decreased energy, feelings of guilt, difficulty concentrating, and/or recurrent thoughts of death or suicidal ideation.[57]

Some of the factors above will be discussed later in the paper as they tie into the importance of physical exercise in soldiers diagnosed with an OSI such as depression. For example, physical exercise can have a positive impact on decreased energy, tiredness, fatigue, impaired ability to think, and concentration levels.

DEPRESSION - OCCURRENCE IN SOLDIERS THAT DEPLOY

“Mental health problems occur in the CF, with 15.1% of Regular Force and 12.7% of Reserve Force personnel having symptoms of one or more of five 12-month mental disorders.”[58] One of these disorders is depression. In one research paper conducted on CAF soldiers deploying on operational peacekeeping missions, it was found that the prevalence for a diagnosis of depression was approximately 10% in male

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[56]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 359.

[57]American Psychiatric Association, *Quick Reference to the Diagnostic Criteria from DSM-IV-TR* (Arlington, West Virginia: American Psychiatric Association Inc., 2000), 168-169.

[58]Statistics Canada, “The Daily: Canadian Community Health Survey: Canadian Forces Supplement on Mental Health,” http://www.statcan.gc.ca/daily-quotidien/030905/dq030905b-eng.htm; Internet; accessed 18 Jan 13.

soldiers.[59] Prevalence rates among Regular Force personnel are similar to those in the Canadian general population of the same age and sex …"[60]

Other countries, such as the US, report depression in 12% of personnel that are currently deployed, and 13.1% among previously deployed veterans.[61] A study conducted in the UK on veterans serving in Iraq in 2003, stated that the prevalence of depression for veterans was 3.7% for MDD while milder depressive disorders were found in 7.4% of veterans.[62]

Overall, the stressful events such as witnessing the death of a friend in combat, witnessing the death of a civilian casualty, being threatened with a weapon, working in a war zone hospital can make soldiers vulnerable and more susceptible to depression. It is also worth noting that stressful events can take place for combat arms soldiers as well as soldiers that are not necessarily involved in kinetic activity such as clinicians in a medical facility, soldiers that operate unmanned aerial vehicles and soldiers that have to handle dead bodies after an IED attack or an ambush. The rates of depression or other mental

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[59]Jitender Sareen, Shay-Lee Belik, Tracie O. Afifi,, Gordon J. G. Asmundson,, Brian J. Cox, and Murray B. Stein, "Canadian Military Personnel's Population Attributable Fractions of Mental Disorders and Mental Health Service Use Associated With Combat and Peacekeeping Operations," *American Journal of Public Health* 98, no. 12, (2008): 2191.

[60]Statistics Canada, "The Daily: Canadian Community Health Survey: Canadian Forces Supplement on Mental Health," http://www.statcan.gc.ca/daily-quotidien/030905/dq030905b-eng.htm; Internet; accessed 18 Jan 13.

[61]Anne M. Gadermann, Charies C. Engel, James A. Naifeh, Matthew K. Nock, Maria Petukhova, Patcho N. Santiago, Benjamin Wu, Alan M. Zaslavsky, and Ronald C. Kessler, "Prevalence of DSM-IV Major Depression Among U.S. Military Personnel: Meta-Analysis and Simulation," *Military Medicine* 177, August Supplement (2012): 47.

[62]Amy C. Iversen, Lauren van Staden, Jamie Hacker Hughes, Tess Browne, Lisa Hull, John Hall, Neil Greenberg, Roberto J Rona, Matthew Hotopf, Simon Wessely and Nicola T Fear. "The Prevalence of Common Mental Disorders and PTSD in the UK Military: Using Data from a Clinical Interview-Based Study," *BMC Psychiatry* 9, no. 68 (2009): 5.

health conditions may be higher in soldiers that are in direct contact of battle due to the nature of their work, however, it should be noted that all personnel that deploy are at greater risk. There is also some research that shows " … deployments to combat zones, could be sufficient enough to trigger depression and/or PTSD among individuals who have pre-existing vulnerability."[63] Another factor that will be discussed later in Chapter Three is the positive impact physical exercise could have on OSIs in preparing soldiers before they deploy.

TREATMENT OF DEPRESSION

Within the CAF, depression is diagnosed and treated by trained Mental Health Clinicians. Many of the treatment methods, such as CBT, Interpersonal Therapy, and other evidence based treatments, are effective ways to helping soldiers with depression. Most treatment programs for varying degrees of depression combine "psychosocial support with antidepressant medication or psychotherapy, such as cognitive behaviour therapy, interpersonal psychotherapy or problem-solving treatment."[64] "Psychosocial treatments are effective and should be the first line treatment for mild depression."[65] "Medicines and psychological treatments are effective in cases of moderate and severe

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[63]David D. Luxton, Nancy A. Skopp, and Shira Maguen, "Gender Differences in Depression and PTSD Symptoms Following Combat Exposure Symptoms," *Depression and Anxiety* 27, no 11 (2010): 1031.

[64]World Health Organization, "Depression Fact Sheet," http://www.who.int/mediacentre/factsheets/fs369/en/index.html; Internet; accessed 23 March 2013.

[65]*Ibid*.

depression."[66] "Antidepressants can be an effective form of treatment for moderate-severe depression but are not the first line of treatment for cases of mild depression."[67]

DEFINITION OF PTSD

PTSD has only been officially sanctioned as a disorder in the DSM since 1980.[68] PTSD criterion can be defined as:

> ...the development of characteristic symptoms following exposure to an extreme traumatic stressor involving direct personal experience of an event that involves actual or threatened death or serious injury, or other threat to one's physical integrity; or witnessing an event that involves death, injury, or a threat to the physical integrity of another person; or learning about unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate.[69]

Symptoms of the disorder may include the person's response which may involve extreme panic, feelings of helplessness, recurring thoughts of the shocking event, avoidance of the associated trauma and a potential increase in symptoms.[70] The diagnosis

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[66]*Ibid*.

[67]*Ibid*.

[68]C. Lasiuk and K.M. Hegadoren, "Posttraumatic Stress Disorder Part I: Historical Development of the Concept*," Perspectives in Psychiatric Care* 42, no 1, (February 2006): 13.

[69]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 463.

[70]*Ibid*., 463.

of PTSD also includes a demonstration of the criterion above for a period of one month or more resulting in impaired functioning at work, home or other social settings.[71]

There are three categories of PTSD symptoms which include the following:

- re-experiencing a traumatic even through recurrent memories, nightmares or flashbacks, anniversary of the event, or situations which are similar to the event;
- avoidance and emotional numbing of symptoms;
- feelings of extreme guilt;
- self-destructive and impulsive behaviour;
- feelings of ineffectiveness;
- social withdrawal, impaired relationships with others; and
- feeling constantly threatened.[72]

Onset of PTSD can occur within 2-3 months of the traumatic event or may even occur later in life, years after the event.[73] Generally, PTSD onset is categorized into acute (duration of symptoms is less than 3 months), chronic **(**symptoms last 3 months or longer) and delayed onset (6 months since the traumatic event and occurrence of symptoms).[74]

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[71]*Ibid*., 463.

[72]*Ibid*., 468 .

[73]Canadian Mental Health Association, "Post Traumatic Stress Disorder," http://www.ontario. cmha.ca/ fact_sheets.asp?cID=3244; Internet; accessed 23 March 2013.

[74]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 468.

PTSD - OCCURRENCE IN SOLDIERS THAT DEPLOY

It is estimated within the CAF that approximately eight per-cent (8%) of persons returning from Afghanistan are diagnosed with PTSD.[75] The study, which was a sample of 2,045 soldiers that had deployed to Afghanistan, also found that overall 13.2% were diagnosed with "an OSI over an average period of follow-up of almost five years."[76]

Findings from US studies on soldiers that that have deployed to Iraq and Afghanistan showed an even higher incidence of OSI.[77] "PTSD was significantly higher after duty in Iraq (15.6% to 17.1%) than after duty in Afghanistan (11.2%) or before deployment to Iraq (9.3%)."[78] For other countries, such as the Australian Defence Force (ADF), "prevalence in Vietnam veterans has been reported at around 17.1 %."[79] "Ten to fifteen years post Gulf-War deployment, 5.4% of 1, 871 ADF Gulf-War Veterans have

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[75]National Defence and the Canadian Forces, "Cumulative Incidence of Post-Traumatic Stress Disorder (PTSD) and Other Mental Disorders in Canadian Forces Personnel Deployed in Support of the Mission in Afghanistan 2001-2008," [report on-line]; available from http://forces.gc.ca/health-sante/ps/mh-sm/osi-bso/sum-som-eng.asp; Internet; accessed 5 May 13.

[76]National Defence and the Canadian Forces, "Cumulative Incidence of Post-Traumatic Stress Disorder (PTSD) and Other Mental Disorders in Canadian Forces Personnel Deployed in Support of the Mission in Afghanistan 2001-2008," [report on-line]; available from http://forces.gc.ca/health-sante/ps/mh-sm/osi-bso/sum-som-eng.asp; Internet; accessed 5 May 13.

[77]Coady B. Lapierre, Andria F. Schwegler, and Bill J. LaBauve, "Posttraumatic Stress and Depression Symptoms in Soldiers Returning from Combat Operations in Iraq and Afghanistan," *Journal of Traumatic Stress* 20, no. 6 (December 2007): 933.

[78]Charles W. Hoge, Carl A. Castro, Stephen C. Messer, Dennis McGurk, Dave I. Cotting, and Robert L. Koffman, "Combat Duty in Iraq and Afghanistan, Mental Health Problems and Barriers to Care," *New England Journal of Medicine* 351, no. 1 (2004): 7.

[79]Brian I. O'Toole, Richard P. Marshall, David A. Grayson, Ralph J. Schureck, Matthew M. Dobson, Margot F. French, Belinda A Pulvertaft, Lenore Meldrum, James Bolton, and Julienne Vennard, "The Australian Vietnam Veterans Health Study: III. Psychological Health of Australian Vietnam Veterans and its Relationship to Combat," *International Journal of Epidemiology* 25, no. 2 (1996): 334.

current PTSD."[80] Finally in the UK, one study conducted from 1993-2001 on a sample of UK Gulf War veterans reported 12% prevalence of PTSD in returning soldiers.[81]

Generally, PTSD is quite prevalent in comparison to other issues for soldiers returning from operational settings and quite commonly there will also be a co-morbid disorder such as anxiety or depression that adversely contributes to the condition. "It is a common observation that 'pure' PTSD is unusual and up to 90% of cases are co-morbid…, chiefly depression and anxiety disorders."[82]

TREATMENT OF PTSD

Within the CAF, PTSD is treated by qualified mental health clinicians using medication to address the disorder and also deal with other co-morbid factors such as depression and anxiety which may exist with the PTSD diagnosis. The types of psychotherapy are similar to the treatments for depression and anxiety that have been previously mentioned in this chapter. "CBT and group therapy are generally felt to be more promising treatments for PTSD."[83] "Exposure therapy, in which the patient re-lives

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[80]J.F. Ikin , M.R. Sim, M.C. Creamer MC, A.B. Forbes, D.P. McKenzie, H.L. Kelsall, D.C. Glass, A.C. McFarlane, M. J. Abramson, P. Ittak, T. Dwyer, L Blizzard, K.R. Delaney, K.W.A. Horsley, W. K. Harrex and H. Schwarz, "War-Related Psychological Stressors and Risk of Psychological Disorders in Australian Veterans of the 1991 Gulf War," *British Journal of Psychiatry* 185, (2004): 120.

[81]Harry A. Lee, Roger Gabriel, Philip J. Bolton, Amanda J. Bale, and Mark Jackson, "Health Status and Clinical Diagnoses of 3000 UK Gulf War Veterans," *Journal of the Royal Society of Medicine* 95, no. 10 (2002): 495.

[82]Edgar Jones and Simon Wessely, *Shell Shock to PTSD, Military Psychiatry from 1900 to the Gulf War* (New York: Psychology Press, 2005), 159.

[83]Canadian Mental Health Association, "Post Traumatic Stress Disorder," http://www.ontario.cmha.ca/ fact_sheets.asp?cID=3244; Internet; accessed 23 March 2013.

the experience under controlled conditions in order to work through the trauma, can also be beneficial."[84]

Most of these soldiers return to full duties, while some remain in the CF with modification to their duties."[85] Many of the military members that do return to duties require some form of coping mechanism to enable them to function at their work, home and in social settings. Some of these coping mechanisms can be negative such as alcohol and drug use, while others utilize counselling and medication to augment their recovery.

DEFINITION OF ANXIETY

"It is estimated that anxiety affects approximately 1 in 10 people."[86] "It is common for people to suffer from more than one type of anxiety disorder and for an anxiety disorder to be accompanied by depression."[87] The DSM IV states that a "Generalized Anxiety Disorder (GAD) is characterized by at least six months of persistent and excessive anxiety and worry."[88] The DSM IV also states that anxiety can

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[84]*Ibid*.

[85]Department of National Defence, "Post Traumatic Stress Disorder," http://www.forces.gc.ca/site/mobil/news-nouvelles-eng.asp?id=3832#/site/mobil/index-eng.asp; Internet; accessed 10 Sep 12.

[86]Canadian Mental Health Association, "Post Traumatic Stress Disorder," http://www.ontario.cmha.ca/ fact_sheets.asp?cID=3244; Internet; accessed 23 March 2013.

[87]*Ibid*.

[88]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 468.

cover a number of disorders such as panic attacks, social phobias, PTSD, and acute stress disorders to name but a few.[89]

Each of the disorders that are associated with signs of an anxiety condition varies to some extent. For example, a panic attack "occurs without warning, accompanied by sudden feelings of terror."[90] "Physically, an attack may cause chest pain, heart palpitations, shortness of breath, dizziness, abdominal discomfort, and feelings of unreality and fear of dying."[91] A person with a social phobia may "feel a paralysing, irrational self-consciousness about social situations… and have an intense fear of being observed or of doing something horribly wrong in front of other people."[92] Someone with an acute stress disorder "is characterized by symptoms similar to those of Posttraumatic Stress Disorder [extreme panic, feelings of helplessness, recurring thoughts of the shocking event, avoidance of the associated trauma and a potential increase in symptoms] that occur immediately in the aftermath of an extremely traumatic event."[93] This also shows the co-morbid association between anxiety disorders and PTSD which were previously mentioned.

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[89]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 429.

[90]Canadian Mental Health Association, "Post Traumatic Stress Disorder," http://www.ontario.cmha.ca/ fact_sheets.asp?cID=3244; Internet; accessed 23 March 2013.

[91]*Ibid*.

[92]Canadian Mental Health Association, "Post Traumatic Stress Disorder," http://www.ontario.cmha.ca/ fact_sheets.asp?cID=3244; Internet; accessed 23 March 2013.

[93]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 429.

ANXIETY - OCCURRENCE IN SOLDIERS THAT DEPLOY

A study conducted by the Deployment Health Section of Canadian Forces Health Services Group (CF H Svcs GP) stated that 8.5% of 1572 respondents that were stationed in Afghanistan between February 2010 and March 2010 "exceeded civilian criteria for symptoms of acute traumatic stress, major depression, or generalized anxiety."[94] More specifically, in the study, it was found that 5.3% of the respondents were identified as having a GAD while 4.6% identified as having acute traumatic stress. A previous 2003 Statistics Canada Study entitled Canadian Community Health Survey: Canadian Forces Supplement on Mental Health, which measured the prevalence of five mental disorders among non-deployed CAF personnel, found that GAD was prevalent in 1.8% of their sample.[95]

A 2004 US study reported that neuropsychiatric symptoms such as anxiety were higher for soldiers that deployed to Iraq versus Afghanistan. The report stated that soldiers that met the screening criteria for diagnosis of GAD, MDD or PTSD ranged from 15.6%-17.1% for Iraq veterans while the figures were 11.2% for Afghanistan veterans.[96] A recent UK study, which summarized available research on health of former soldiers of the UK Armed forces, found that one of the most common mental health issues for ex-

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[94]Bryan G. Garber, Mark A. Zamorski, and Rakesh Jetly, "Mental Health of Canadian Forces Members While on Deployment to Afghanistan," *Canadian Journal of Psychiatry* 57, no 12, (2012): 736.

[95]Statistics Canada, "The Daily: Canadian Community Health Survey: Canadian Forces Supplement on Mental Health," http://www.statcan.gc.ca/daily-quotidien/030905/dq030905b-eng.htm; Internet; accessed 18 Jan 13.

[96]Charles W. Hoge, Carl A. Castro, Stephen C. Messer, Dennis McGurk, Dave I. Cotting, and Robert L. Koffman, "Combat Duty in Iraq and Afghanistan, Mental Health Problems and Barriers to Care," *New England Journal of Medicine* 351, no. 1 (2004): 7.

soldiers was anxiety disorders along with other problems such as depression and alcoholism.[97] Finally, in a 2010 study on mental health in the ADF, researchers stated that "anxiety disorders are the most common mental disorder type in the ADF, with higher prevalence among females."[98]

TREATMENT OF ANXIETY

In the CAF, anxiety is treated by qualified mental health professionals who typically combine medication such as anti-depressants and anti-anxiety drugs with CBT. This type of therapy emphasizes "observable outcomes, symptom amelioration, time-limited and goal-oriented intervention, and an expectation that patients will assume an active role in getting better."[99] Generally, CBT aims to reduce the anxiety symptoms by enabling patients to "…turn their anxious thoughts, interpretations and predictions into thoughts which are more rational and less anxious."[100] Other avenues of treatment include group therapy, breathing techniques, and educational sessions.

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[97]Nicola Fear, Dan Wood, and Simon Wessely, "Health and Social Outcomes and Health Service Experiences of UK Military Veterans A Summary of the Evidence," [report on-line]; available from http://www.mhne.co.uk/files/MHNE383.pdf; Internet; accessed 23 March 2013.

[98]Vice Chief of the Defence Force, "Mental Health in the Australian Defence Force 2010 ADF Mental Health Prevalence and Wellbeing Study Executive Report," [report on-line]; available from http://www.defence.gov.au/health/dmh/docs/2010%20ADF%20Mental%20Health%20&%20Wellbeing%20Study%20Executive%20Report.pdf; Internet; accessed 23 March 2013.

[99]Victoria C. Follette and Joseph I. Ruzik, *Cognitive-Behavioral Therapies for Trauma, Second Edition*, (New York: The Guilford Press, 2006), 1.

[100]Canadian Mental Health Association, "Post Traumatic Stress Disorder," http://www.ontario.cmha.ca/ fact_sheets.asp?cID=3244; Internet; accessed 23 March 2013.

CHAPTER 2 – MENTAL HEALTH BENEFITS OF PHYSICAL EXERCISE

The benefits of physical exercise on mental and physical health are well documented in many research articles. For example, Penedo in 2007 stated that "... exercise, physical activity and physical activity interventions have beneficial effects across several physical and mental-health outcomes."[101] In another article, Kravitz in 2007 stated that "there is a growing understanding of how certain levels of physical activity may positively affect cardiovascular, musculoskeletal, respiratory and endocrine function, as well as mental health."[102]

In terms of the physical benefits of physical exercise, there is substantial evidence that it can "contribute to the primary and secondary prevention of several chronic diseases and is associated with a reduced risk of premature death."[103] Research in this area is vast and demonstrates that physical exercise can greatly reduce the risk of physical disease and have a positive impact on the quality and quantity of life. However, the substantial research done on the impact of physical exercise on physical well-being is beyond the scope of this paper. The focus of this paper, and this chapter in particular, is on the impact that physical exercise has on psychological well-being.

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[101]Frank J. Penedo and Jason R. Dahn, "Exercise and Well-Being: A Review of Mental and Physical Health Benefits Associated with Physical Activity," *Current Opinion in Psychiatry* 18, no. 2 (2005): 189.

[102]Len Kravitz, "The 25 Most Significant Health Benefits of Physical Activity and Exercise," *Idea Fitness Journal* (October 2007): 54-55.

[103]Darren E.R. Warburton, Crystal Whitney Nicol, and Shannon S.D. Bredin, "Health Benefits of Physical Activity: The Evidence," *Canadian Medical Association Journal* 174, no. 6, (2006): 802.

"A growing body of epidemiologic research on adults suggests that people who are more active have lower levels of anxiety and depression symptoms."[104] The epidemiological research using human samples, were generally either correlational (determining a relationship between variables) or pre/post intervention designs. Much of the research within the area is correlational, so the direction of causation cannot always be absolutely determined. However, substantial "evidence suggests that physical activity may contribute to improved mood and increased self-esteem, self-confidence and sense of control."[105]

Many people can attest to the improved mental capacity incurred after physical exercise. Statements such as 'I can think clearer after I workout' or 'I forget all of my concerns while I am exercising' are common with people that incorporate physical exercise into their daily regimen. The association between 'healthy body' and a 'healthy mind' is also a common adage that most people are familiar with and there is general consensus that if a person conducts physical exercise they have a better perspective or outlook on life.

However, there seems to be more research on the physical effects of physical exercise and less on the psychological effects. The issue may lie in the fact that it takes more time and effort to develop and validate measures to assess psychological properties. For example, how do we measure stress or determine the benefit that physical exercise can have on our well-being?

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[104]Patricia M. Dubbert, "Physical Activity and Exercise: Recent advances and Current Challenges," *Journal of Consulting Clinical Psychology* 70, no. 3 (2002): 527.

[105]Alberta Healthy Living Network, *Common Messages for Mental Health & Active Living* (Edmonton, Alberta: Alberta Centre For Active Living, 2008), 2.

This chapter will focus on the psychological and/or mental health benefits of physical exercise; specifically, the impacts that physical exercise have on depression, PTSD and anxiety; as well as the psychological impacts related to stress levels, and feelings related to self-esteem, well-being and quality of life. The chapter will describe findings from peer reviewed scientific journals that show the positive psychological outcomes derived from physical exercise.

DEPRESSION

As previously defined, depression is a mood disorder that "is characterized by reduced mood, sadness, and lost enthusiasm for previously interesting activities in daily life."[106] It is a disorder that can have an impact on many other psychological constructs such as increased stress, and decreased feelings of well-being, self-esteem, and quality of life, as discussed later in this chapter. A diagnosis of depression can adversely affect these constructs to a point where an individual becomes ineffective. The aim of this section is to discuss some of the research that shows the impact of physical exercise on reducing the symptoms of depression.

There is substantial evidence that shows "physical exercise can be an effective treatment against depression."[107] It has also been shown that "aerobic exercise at a dose consistent with public health recommendations is an effective treatment for MDD of mild

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[106]American Psychiatric Association, *Quick Reference to the Diagnostic Criteria from DSM-IV-TR* (Arlington, West Virginia: American Psychiatric Association Inc., 2000), 168-169.

[107]Sebastian Eriksson and Gunvor Gard, "Physical Exercise and Depression," *Physical Therapy Reviews* 16, no. 4 (2011): 261.

to moderate severity."[108] Generally, physical exercise can have an impact on the components that affect one's mood. "The large majority of both health professionals and exercisers themselves believe that exercise has benefits for the improvement of mood states."[109] For example, in one recent journal article by Eriksson and Gard, which was a review of eight studies that used physical exercise as a means to treat depression, found that mood was significantly improved and that the symptoms of depression were reduced in seven of the eight studies.[110]

So how are mood states improved and depression reduced through physical exercise? First, it is important to discuss the physiological aspects of altering one's mood state through physical exercise. It is not the premise of this paper go into great detail on clinical aspects; however, it is worth mentioning as there are a number of theories that postulate that physical exercise has a marked effect on increasing physiological factors that have a positive outcome on the symptoms of depression.

First, one of the most common theories states that depression stems from a lack of serotonin in the brain. "The lack of serotonin produces a secondary lack of norepinephrine, enhancing feelings of depression," and physical exercise has been proven to increase the stimulation of serotonin bringing about positive feelings and treatment

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[108]Andrea L. Dunn, Madhukar H. Trivedi, James B. Kampert, Camillia G. Clark, and Heather O. Chambliss, "Exercise Treatment for Depression Efficacy and Dose Response," *American Journal of Preventive Medicine* 28, no 1 (2005): 1.

[109]A. Byrne and D.G. Byrne, "The Effect of Exercise on Depression, Anxiety and Other Mood States: A Review," *Journal of Psychosomatic Research* 37, no. 6 (1993): 565.

[110]Sebastian Eriksson and Gunvor Gard, "Physical Exercise and Depression," *Physical Therapy Reviews* 16, no. 4 (2011): 261.

outcomes.[111] The theory, known as Monoamine Hypothesis states that, "[physical] exercise leads to an increase in the brain's availability of brain neurotransmitters (e.g. serotonin, dopamine and norepinephrine) that are diminished with depression."[112] This research is also backed by the National Institute for Health and Clinical Excellence, of the United Kingdom, which states that serotonin function increases with [physical] exercise.[113]

Another study showed that physical exercise "increases the rate and frequency at which serotonin is "fired" within the brain, resulting in an increase in both the release and synthesis of it."[114] "The exact mechanism is not clearly understood; however, it is clear that aerobic exercise improves mood through increasing brain serotonin levels."[115] The research within the area has not been conducted on human subjects but rather on animal subjects; therefore, although showing positive results, further research is required to truly provide definitive findings.

Second, the Thermogenic Hypothesis postulates that a "rise in core body temperature following [physical] exercise is responsible for the reduction of the

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[111]Sebastian Eriksson and Gunvor Gard, "Physical Exercise and Depression," *Physical Therapy Reviews* 16, no. 4 (2011): 261.

[112]Lynette L. Craft and Frank M. Perna, "The Benefits of Exercise in the Clinically Depressed," *Primary Care Companion Journal of Clinical Psychiatry* 6, no 3 (2004):108.

[113]Michelle Turcotte, "The Effects of Exercise on Serotonin Levels," http://www.livestrong.com /article/22590-effects-exercise-serotonin-levels/; Internet; accessed 23 March 2013.

[114]*Ibid*, 1.

[115]*Ibid*, 1.

symptoms of depression."[116] Although the findings for this research have shown a decrease in feelings of anxiety, further research within this area should be focused on the affect of physical exercise on depression since the symptoms of depression are often co-morbid with those of anxiety.

Another area of study suggested by Craft (2004) is the Endorphin Hypothesis. This theory states that physical exercise results in a release of endorphins which provides a euphoric feeling having a knock-on effect of countering feelings of depression, thereby providing a higher sense of well-being and positive outlook. This is the theory most often associated with the notion of a runner's high and the elevation of a positive mood.[117]

There is substantial evidence that physical exercise can decrease depressive symptoms, via the way it increases production and use of certain brain chemicals and other physiological mechanisms. Overall, the theories described here have all shown some promise for stimulating physiological factors such as serotonin, tryptophan, norepinephrine, dopamine, rise in core body temperature, and increase in endorphins which have all shown positive effect on decreasing the symptoms of depression.

The bottom line is that physical exercise can be seen as part of the treatment regime for depression since "experimental studies have shown that aerobic and resistance

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[116]Lynette L. Craft and Frank M. Perna, "The Benefits of Exercise in the Clinically Depressed," *Primary Care Companion Journal of Clinical Psychiatry* 6, no 3 (2004): 107.

[117]*Ibid*., 107.

exercise may be used to treat moderate and more severe depression, usually as an adjunct to standard treatment …"[118]

PTSD

As previously defined, PTSD includes symptoms such as re-experiencing a traumatic event through recurrent memories, avoidance and emotional numbing of symptoms, feelings of extreme guilt; impulsive behaviour; feelings of ineffectiveness, etc.[119] Many of the symptoms of PTSD can be positively affected by physical exercise. Previous discussion within this paper has shown that physical exercise has a positive impact on depression and anxiety, which are often co-morbid diagnoses with PTSD. Therefore, it stands to reason that many of the symptoms incurred with a diagnosis of PTSD will also be positively affected through physical exercise such as symptoms related to avoidance, feelings of ineffectiveness, and social withdrawal.

There is some research that has demonstrated that physical exercise has a positive correlation with a reduction in PTSD symptoms. For example, one study showed that "engagement in physical activity, especially vigorous activity, is significantly associated with decreased odds of PTSD symptoms among U.S. service members."[120] While in

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[118]Canadian Mental Health Association, compiled by Paula Bude Bingham, "Minding our Bodies Physical Activity and Mental Health Literature Review," http://www.mindingourbodies.ca/about_the_project/ literature_reviews/physical_activity_and_mental_health; Internet; accessed 23 March 2013.

[119]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 463.

[120]Cynthia A. LeardMann, Molly L. Kelton, Besa Smith, Alyson J. Littman, Edward J. Boyko, Timothy S. Wells, and Tyler C. Smith, "Prospectively Assessed Posttraumatic Stress Disorder and Associated Physical Activity," *Public Health Reports* 126, (May-June 2011): 371.

another study, physical exercise showed significant reductions in PTSD, anxiety, and depression following a one-month program of vigorous physical exercise intervention.[121] The gains made from the program were also maintained during a one- month follow-up which suggests that "[physical] exercise programs may be valuable resources for managing treatment-resistant participants with PTSD."[122] Finally, another study conducted on children with PTSD, provided support for the notion that there were "positive effects of aerobic exercise on reducing PTSD, depression, and anxiety and that fewer participants met full criteria for PTSD after exercising."[123]

Generally, it can be said that some of the symptom-reducing aspects that physical exercise has on depression and anxiety also relate to PTSD. For example, feelings of ineffectiveness and disturbed sleep patterns may be common in all three conditions. Therefore, it can be said that an increase in physical exercise can provide an individual with another positive coping mechanism for the reduction of symptoms in each condition.

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[121]T.A. Manger and R.W. Motta, "The Impact of an Exercise Program on Posttraumatic Stress Disorder, Anxiety, and Depression," *International Journal of Emergency Mental Health* 7, no. 1 (2005): 49.

[122]T.A. Manger and R.W. Motta, "The Impact of an Exercise Program on Posttraumatic Stress Disorder, Anxiety, and Depression," *International Journal of Emergency Mental Health* 7, no. 1 (2005): 49.

[123]C.L. Newman and R.W. Motta, "The Effects of Aerobic Exercise on Childhood PTSD, Anxiety, and Depression," *International Journal Of Emergency Mental Health* 9, no. 2 (2007): 133.

ANXIETY

As previously defined, the DSM IV states that a GAD "is characterized by at least six months of persistent and excessive anxiety and worry."[124] The aim of this section is to discuss some of the research that has been conducted on the physiological impacts that physical exercise has on anxiety.

"The results of over thirty published papers substantiate a link between acute and chronic [physical] exercise and the reduction of anxiety."[125] It has also been shown that "… single [physical] exercise sessions of moderate [physical] exercise can reduce short-term physiological reactivity to anxiety stressors and enhance recovery."[126]

The physiological impacts of physical exercise on anxiety are similar to those that affect depression. For example, the Thermogenic Hypothesis, which was defined as a rise in core body temperature from physical exercise, can be used to explain reductions in anxiety symptoms and has been proven to be more effective in treating anxiety than in depression.[127]

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[124]American Psychiatric Association, Michael B. First (ed.), *Diagnostic and Statistical Manual of Mental Disorders – 4th Ed. (DSM-IV-TR)* (Washington, DC: American Psychiatric Association, 2000), 468.

[125]Deirdre Scully, John Kremer, Mary M. Meade, Rodger Graham, and Katrin Dudgeon, "Physical Exercise and Psychological Well-Being: A Critical Review," *British Journal of Sports Medicine* 32, no. 2 (1998): 113.

[126]A.H. Taylor, Physical Activity, Anxiety, and Stress. quoted in Canadian Mental Health Association, compiled by Paula Bude Bingham, "Minding our Bodies Physical Activity and Mental Health Literature Review," http://www.mindingourbodies.ca/about_the_project/ literature_reviews /physical_activity_and_mental_health; Internet; accessed 23 March 2013.

[127]Lynette L. Craft and Frank M. Perna, "The Benefits of Exercise in the Clinically Depressed," *Primary Care Companion Journal of Clinical Psychiatry* 6, no 3 (2004):107.

Again, similar to depression, research has indicated that, as per the Monoamine Hypothesis, physical exercise can positively impact anxiety. For example in one study, it was found that "[physical] exercise was an effective approach to relieve anxiety and protect the brain against uncontrollable stress."[128] Essentially, the study showed that, in animal models, an increase in physical exercise was associated with an increase in dopamine, noradrenalin, and serotonin, which "are the three major neurotransmitters that are known to be modulated by [physical] exercise" and have a positive effect on anxiety.[129] Animal models were used because researchers were examining cause and effect and needed to conduct brain assays (an exploratory procedure). Essentially increases in these neurotransmitters act as an anxiolytic (relief of anxiety) and reduce the paralytic effects of the condition. "Clinical studies suggest that Monoamine systems play central roles in resistance and recovery induced by chronic moderate physical exercise from various diseases like mental disorders."[130]

PSYCHOLOGICAL FUNCTIONS

The physiological aspects such as an increase in neurotransmitters (dopamine, noradrenalin, and serotonin) related to the symptoms of depression, PTSD and anxiety are only part of the picture. There are other quantitative factors that fall into the psychological category of determining the impact of physical exercise on mental health.

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[128]Tzu-Wei Lin and Yu-Min Kuo, "Exercise Benefits Brain Function: The Monoamine Connection," *Brain Science* 3, (2013): 44.

[129]*Ibid.,* 44.

[130]*Ibid*., 40.

Psychological factors are those that are affected through the interaction between the body and the mind. These psychological factors can have an impact in reducing the symptoms of depression, PTSD and anxiety. For example, a person experiencing a high level of stress may have some internal conflict that could result in failure or an adverse outcome. Physical exercise can have an impact on reducing stress, improving one's self-esteem, well-being and quality of life, all of which can have a positive outcome on the adverse symptoms associated with OSIs.

STRESS

Many things in a person's life can contribute to stress. For instance, being diagnosed with a mental illness, loss of a job, a tough supervisor, can all compound the level of stress in an individual. This may have an incapacitating effect on day-to-day functioning at work or within social activities and also adversely contribute to a condition such as depression, PTSD and/or anxiety. People can also incur stress because they feel they lack the resources, capabilities, and/or are simply unable to control a situation which is common in a mental health diagnosis. Generally, "stress occurs when one's personal capabilities or resources are appraised by the individual as insufficient to meet the needed behavior."[131]

In order to mitigate the risks associated with stress, people try to find ways to alleviate the symptoms. Researchers, such as Carver et al., have identified a number of coping mechanism such as planning, suppression of competing obligations, and seeking

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[131]Bonnie G. Berger, "Coping With Stress: The Effectiveness of Exercise and Other Techniques," *Quest* 46, no. 1 (1994): 101.

social support as a way of coping with stress.[132] Physical exercise can be another coping strategy that would incorporate many of the mechanisms identified in Carver's research. It has been shown that physical exercise can reduce stress and anxiety on a daily basis.[133] Once a person is able to plan physical exercise into their daily regimen and use it as an active coping mechanism, other areas (i.e. interaction with others, coping abilities during stressful situations) within a person's life improve. For example, a person with less stress will have heightened clarity in their thought, have a more positive outlook on life, interact more effectively with others, have a better social network and potentially be higher functioning. The reduction in stress due to physical exercise (and active coping mechanism) essentially helps organize a person's mind, enabling them to potentially lead a more positive and fulfilling life.

The majority of research findings on the association between physical exercise and stress show that there is a positive relationship between an increase in physical exercise and a decrease in stress. For example, Salmon (2000) showed that an individual's sensitivity to stress was reduced after physical exercise training.[134] This study also showed that "aerobic exercise can protect against the emotional and physiological consequences of stress."[135] In another study, Fox (2000) showed "the value

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[132]Charles S. Carver and Michael F. Schier, "Assessing Coping Strategies: A Theoretically Based Approach," *Journal of Personality and Social Psychology* 56, no. 2 (1989): 273.

[133]K.R. Fox, "The Influence of Physical Activity on Mental Well-Being," *Public Health Nutrition* 2, no. 3A (1999): 411.

[134]Peter Salmon, "Effects of Physical Exercise on Anxiety, Depression, and Sensitivity to Stress: A Unifying Theory," *Clinical Psychology: Science and Practice* 21, no. 1 (2000): 51.

[135]*Ibid*., 51.

of various forms of physical activity, exercise and sport for the promotion of mental health."[136] Although more clinically based research needs to be conducted within this area, there is a growing body of knowledge that clearly shows the positive impact of physical exercise on mental health, specifically in the reduction of the symptoms of stress.[137]

SELF-ESTEEM

Self-esteem can be defined as a "feeling of trust in one's abilities, qualities, and judgment."[138] If a person has strong self-esteem they will have a greater sense of self-worth, and possibly be less susceptible to mental health problems. As discussed in the previous chapter, problems related to OSIs such as negative or recurring thoughts related to a traumatic experience can be improved upon through a positive self-image and high self-esteem. One way of achieving a heightened level of self-image is through physical exercise. The fact that someone maintains a scheduled regimen of physical exercise can give them heightened confidence in their abilities leading to stronger self-esteem.

Research in this area shows moderate support for physical exercise having an impact on improving self-esteem. For example, in one study, which was a literature review on clinical and epidemiological findings, physical exercise at a moderate level had

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[136]K.R. Fox, "The Influence of Physical Activity on Mental Well-Being," *Public Health Nutrition* 2, no. 3A (1999): 411.

[137]C3 Collaborating for Health, "Review - The Benefits of Physical Activity for Health and Well-Being," (London: C3 Health, 2011), 6.

[138]Oxford Dictionary, http://oxforddictionaries.com/definition/english/self-confidence; Internet; accessed 7 April 2013.

an impact on self-esteem and "moderately favourable effects on self- perceptions, mood and psychological well-being."[139]

WELL-BEING AND QUALITY OF LIFE

In order to contextualize 'well-being' this paper refers to the term as a psychological state that is on the opposite end of a continuum from poor health or a negative outlook on life. "Psychological well-being research and practice is concerned with the promotion of positive experiences, health, strength, resources, supplies, competencies and skills."[140] Well-being can be further defined as "acceptance of personal strengths and limitations …, and finding personal meaning through purpose in life and optimising unique abilities and talents through personal growth." [141] Research within the area states that well-being is subjective and concerned with "how and why people experience their lives in positive ways, including both cognitive judgement and affective reactions."[142] Well-being can be subjective, but generally, most people would define the construct in terms of achieving ultimate happiness and personal satisfaction. In one article by Diener, who has conducted extensive research within the area of well-being, he defines three 'hallmarks' of well-being and they include subjectivity, positive measures

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[139]Stuart J.H. Biddle, Ken Fox and Steve Boutcher, *Physical Activity and Psychological Well-Being* (London: Routledge, 2000), 24.

[140]Stephen D. Edwards, Humphrey S.B. Ngcobo, David J. Edwards and Kevin Palavar, "Exploring the Relationship between Physical Activity, Psychological Well-Being and Physical Self Perception in Different Exercise Groups," *South African Journal for Research in Sport, Physical Education and Recreation* 27, no. 1 (2005): 76.

[141]*Ibid*., 76.

[142]Ed Diener, "Subjective Well-Being*," Psychological Bulletin* 95, no. 3 (1984): 542.

and the measures which include an assessment of all aspect's of a person's life.[143] Well-being is also associated with a good quality of life which is based on a number of determinants such as material well-being, health, family life, and community life.[144]

Through physical exercise, an individual can achieve many of the aspects that contribute to well-being and a good quality of life. For example, an individual that partakes in recreational activities will push themselves through physical exertion, thereby gaining an understanding of their strengths and achieving some personal growth. Through this involvement, a person can achieve better quality of life and a heightened sense of well-being. Research has shown that regular physical exercise is related to "improved psychological well-being."[145] Another example that illustrates the positive effect of physical exercise on well-being is through the development of relationships through recreational activities.

A favourable quality of life can be heightened through physical exercise and the social aspects of involvement in activities. If an individual is in a positive state of well-being then s/he would generally perceive they have a good quality of life. People who engage in routine physical exercise "perceived themselves to be having more autonomy,

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[143] *Ibid*., 543-544.

[144] The Economist Intelligence Unit's Quality-Of-Life Index, "The World in 2005," http://www.economist.com/media/pdf/QUALITY_OF_LIFE.pdf ; Internet; accessed 7 April 2013.

[145] Darren E.R. Warburton, Crystal Whitney Nicol, and Shannon S.D. Bredin, "Health Benefits of Physical Activity: The Evidence," *Canadian Medical Association Journal* 174, no. 6, (2006): 806.

personal growth, environmental mastery, purpose in life, positive relations with others, self-acceptance, sport competence and conditioning than non-exercisers."[146]

SUMMARY

The previous findings have shown that there is a reduction in symptoms of depression, PTSD and anxiety in persons that conduct physical exercise. It has also been shown that physical exercise has a positive impact on cognitive function, reducing stress, and enhancing self-esteem and well-being which are all factors that can improve a person's mood state and reduce the symptoms of OSIs. For these reasons, physical exercise should be utilized in treatment methods for OSIs. The next section will further define the use of physical exercise in persons with OSI and discuss the utilization of physical exercise in treating people with OSIs.

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[146]Stephen D. Edwards, Humphrey S.B. Ngcobo, David J. Edwards and Kevin Palavar, "Exploring the Relationship between Physical Activity, Psychological Well-Being and Physical Self Perception in Different Exercise Groups," *South African Journal for Research in Sport, Physical Education and Recreation* 27, no. 1 (2005): 86.

CHAPTER 3 – TREATING OSIs WITH PHYSICAL EXERCISE

The positive impact that physical exercise has on OSI symptoms was demonstrated in the previous section. Hence, this section will discuss the aspects of utilizing physical exercise as an adjunct to treatment for persons with OSIs. Specifically, the section will address the following. First, the chapter will discuss types of physical exercise and different modes, duration and level of physical intensity that have been used in research to show a positive impact on OSIs. Second, this chapter will discuss the barriers to utilizing physical exercise as an adjunct to OSI treatments, including the concepts of motivation and compliance as they relate to persons with OSIs. This second section will explore the difficulties that a person with an OSI may incur which could impede their success when conducting physical exercise treatment programs**.** As mentioned, some of the co-morbid symptoms associated with depression, PTSD and anxiety (i.e. avoidance, panic attacks, withdrawal, motivation, etc.) may inhibit a person with an OSI from pursuing or completing a prescribed physical exercise program. Third, the chapter will discuss the utilization of physical exercise in preparing personnel for deployments on military missions and address the term resilience. Finally, this chapter will examine the benefits of using physical exercise as an adjunct to treatment and compare it to the current treatment models that are based solely on medication prescription and psychological counseling.

PHYSICAL EXERCISE TREATMENT METHODS

There are a variety of physical exercise programs that can be utilized as an adjunct to treating OSIs. Some examples of physical exercise are walking, biking, hiking, treadmill running and competitive cycling. Many research studies that aim to reduce OSI symptoms through physical exercise focus on a variety of programs such as aerobic and non-aerobic activities. The following review will discuss some of the research in this area and show typical programs that have been utilized in order to alleviate the symptoms associated with mental health conditions such as OSIs.

Most research in the area has utilized some form of physical exercise intervention, control groups and patients receiving medication or a placebo in order to provide comparative results.[147] Generally, the types of physical exercise that researchers assess are strength training, aerobic training, and low and high intensity exercise. Experimental groups are often compared to control groups and comparison groups that were on medical prescriptions for their depression. Some of the studies have also used longitudinal follow-ups to determine the long-term effects.

Eriksson and Gard, in 2011, conducted a review of eight peer reviewed scientific studies from 2001-2009, comparing the different outcomes from research of physical exercise on depression. The majority of the research within the area used strength training, aerobic training, home based exercise programs, stretching programs, high and low intensity training, high energy and low energy weightlifting groups along with

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[147]Andréa Deslandes, Helena Moraes, Camila Ferreira, Heloisa Veiga, Heitor Silveira, Raphael Mouta, Fernando A.M.S. Pompeu, Evandro Silva Freire Coutinho, and Jerson Laks, "Exercise and Mental Health: Many Reasons to Move," *Neuropsychobiology* 59, (2009): 192.

placebo and control groups for comparative study.[148] The timeframes for the various articles ranged from ten days to five months.[149] Generally, there was a "mood enhancing effect of exercise [which] was identified in the interventions regardless of the mechanism of action."[150] High intensity physical exercise appeared to be pivotal, and positive effects on depression appeared to be more apparent for both high impact aerobic exercise as well as high intensity progressive weight training.[151] In four out of the eight studies, there was a greater decrease in depressive symptoms for the physical exercise in comparison to the placebo groups. Overall, the outcome of the review was that physical exercise "significantly improved mood and reduced depression," although in some of the studies the physical exercise group did not greatly differ from the placebo group or had the same positive effect as the groups on treatment medication.[152]

In an article from 1993, Byrne and Byrne "review[ed] recent (post-1975) studies which have focused on the effect of [physical] exercise on mood adjustment" and discussed a number of physical exercise treatments that had a positive effect on depression, anxiety and mood states.[153] Most studies within their review used aerobic activity exercises, such as running, and non-aerobic activity such as weight training. It

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[148]Sebastian Eriksson and Gunvor Gard, "Physical Exercise and Depression," *Physical Therapy Reviews* 16, no. 4 (2011): 263.

[149]*Ibid*,. 263.

[150]*Ibid*., 267.

[151]*Ibid*., 263-264.

[152]*Ibid*., 261.

[153]A. Byrne and D.G. Byrne, "The Effect of Exercise on Depression, Anxiety and Other Mood States: A Review," *Journal of Psychosomatic Research* 37, no. 6 (1993): 565.

was found that there were improvements in symptoms related to depression, anxiety and mood in approximately 86% of the subjects. Some of the findings from the review also showed that low-intensity physical exercise was effective in improving mood states.

Generally, the two journal articles discussed above stated that further research is required within the area in order to make further causal interpretations between physical exercise and reduction in OSI symptoms. Specifically there is a need for additional research focused on " … mechanisms of action, type of [physical] exercise, intensity and frequency of [physical] exercise" in order to make clear inferences in the association between physical exercise and OSIs.[154]

The effectiveness of physical exercise on psychological states is evident; however, in order to provide a full understanding of the issue it is also important to discuss some of the drawbacks in the findings of the research within the area.

First, many of the studies were not longitudinal and did not having recurring observations over a longer period of time. Many of the studies were as short as ten days, while the longest was for five months. It is important to conduct longitudinal studies to determine the long-term impacts of physical exercise on mental health symptoms; therefore, further research within the area is needed to show positive outcomes over a longer period of time. The use of physical exercise used as adjunct to other treatment methods need to be researched in a more rigorous manner.

Second, the majority of the studies were conducted within a controlled experimental environment. Generally, people perform differently in a controlled

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[154]*Ibid*., 267.

environment and there may have been more compliance compared to what would have actually happened if they were completing a physical exercise prescription on their own. Individuals diagnosed with a mental health condition need to have treatment options that they can incorporate into their daily routine and not just within a research lab or group counseling environment.

Finally, in some of the research, the psychological state of the subjects was unclear. For example, the degree of symptomatology within the psychological disorder was not established. It is important to create a baseline in order to compare the effects of physical exercise as an adjunct to treatment. The experimental groups and the control/comparison groups need to be at the same type and level of symptomatology in order to discern if there are symptom improvements related to physical exercise. To achieve this, a baseline behavior needs to be clear and there has to be other control or placebo group in order to make a comparison and show improvements.

To address these limitations, research within the area needs to be more stringent. It is still unclear whether high intensity versus low intensity levels are more effective, hence more research on the duration, intensity and type of activities is needed. The short term observations are quite promising but mental health conditions can be prominent throughout the lifespan of an individual diagnosed with a condition, therefore, various forms of physical exercise need to be assessed in a more rigorous manner in order to achieve a credible impact.

BARRIERS TO USING PHYSICAL EXERCISE AS A TREATMENT MODALITY FOR PERSONS WITH OSIs

This section will discuss the barriers to utilizing physical exercise as an adjunct to OSI treatments by addressing the topics of motivation and compliance. The section will also provide a table of factors to consider when preparing a physical exercise routine for an individual with an OSI.

Anyone that has embarked on a physical exercise routine knows that it can be difficult to achieve short and long-term fitness goals. It is easy to set-up a program for a person with an OSI but what are the chances that compliance to the activity will be successful? For an individual with an OSI, the barriers to a successful outcome can be compounded by feelings of avoidance, panic attacks, the desire or need to withdraw from social settings and motivation issues surrounding basics such as organizing a daily routine.

The main factors that have an impact on achieving success within a physical exercise program are motivation and compliance. "Motivation is the stimulus or influence that compels a person to pursue a physically demanding activity."[155] Without the requisite motivation, success within a physical exercise program is destined for failure.

In addition to motivation, compliance is a key factor that can affect adherence to a physical exercise program. Compliance is "the process of conforming to another's wishes in order to fulfill a requirement or feeling compelled to participate out of a sense of

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[155]Patrick Milroy and Gary O'Neil, "Factors Affecting Compliance to Chiropractic Prescribed Home Exercise: a Review of the Literature," *Journal of the Canadian Chiropractic Association* 44, no. 3 (2000): 142.

obligation."[156] "Patients with anxiety or depressive disorders present special challenges for physical exercise compliance."[157] "In addition to the fears that many anxiety patients harbor toward physical exercise, the setting itself can sometimes be an anxiety-inducing stimulus."[158] The key barriers to compliance that can affect a person with an OSI are presented in Table 3.1

Table 3.1 Factors that Affect Compliance to Physical Exercise Programs for Persons with OSIs

Factors	Considerations
1. Self-determination	- What are the intrinsic and extrinsic motivators for the individual to pursue a physical exercise program?
2. Mental Health Condition	- What is the individual's state of mind (i.e., anxious, avoidant behavior, high/low stress, high/low self esteem, well-being, quality of life, etc.)?
3. Communication Between Clinician and Individual	- How was the physical exercise program introduced into the treatment methodology? - Is the individual taking ownership of the routine? - Was the individual successful in the past with physical exercise? - Do they have an interest in physical exercise? - Has it always been a part of their routine?
4. Social Network	- What support does the individual have at home? - What support does the individual have to assist him/her through the physical exercise program?
5. Resources within the Community	- What facilities are available to the individual to assist him/her to achieve physical exercise goals?

Source: Adapted From – Patrick Milroy and Gary O'Neil, "Factors Affecting Compliance to Chiropractic Prescribed Home Exercise: a Review of the Literature," *Journal of the Canadian Chiropractic Association* 44, no. 3 (2000): 141-148.

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[156]*Ibid*., 143.

[157]Egil W. Martinsen, "Physical Activity in the Prevention and Treatment of Anxiety and Depression," *Nordic Journal of Psychiatry* 64, no. S47 (2008): 27.

[158]*Ibid*,. 27.

The first point that can affect compliance, and potentially the most important, is self-determination. Motivation can affect self-determination through intrinsic and extrinsic factors. Intrinsic or internal factors related to the person. "Intrinsic motivation can be defined as participating in an activity for itself and for the pleasure derived from the participation."[159] Other examples of intrinsic motivation are the enjoyment that one gets from participating in physical exercise, the emotional release of energy that one achieves from participating, and finally the improvement in one's self by achieving goals.[160] For example, intrinsically, an individual with an OSI may comply with a physical exercise program because s/he feels the requirement to do so out of personal motivation (i.e. it makes him/her happy). The decision to complete a routine may make the individual feel better because s/he has achieved a personal goal or it alleviates feelings of anxiousness.

Extrinsic factors are external aspects that motivate a person to participate in an activity (i.e. monetary or social reward). People that are extrinsically motivated will participate in "an activity as a means to an end and not for the activity's own sake."[161] Some examples of extrinsic motivators are the social friendships one gets by participating in physical exercise and the competitiveness of the activity which motivates an individual

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[159]Robert J. Vallerand, "Intrinsic and Extrinsic Motivation in Sport," *Encyclopedia of Applied Psychology* Volume 2 (2004): 427.

[160]Patrick Milroy and Gary O'Neil, "Factors Affecting Compliance to Chiropractic Prescribed Home Exercise: a Review of the Literature," *Journal of the Canadian Chiropractic Association* 44, no. 3 (2000): 142.

[161]Robert J. Vallerand, "Intrinsic and Extrinsic Motivation in Sport," *Encyclopedia of Applied Psychology* Volume 2 (2004): 427.

to achieve their goals.[162] Whereas extrinsically, an individual with an OSI may comply with a group military physical training session because s/he feels obligated to participate since his/her superiors expect him/her to do so.

Strong intrinsic motivation is more likely to result in compliance to a physical exercise program. Generally, physical "exercise adherers demonstrate an intrinsic (incentive to exercise based on the expected enjoyment) motivation to exercise."[163] An individual requires the self-determination to pursue a program because it reduces the symptoms of the condition (it makes them happy) and the person gains self-fulfillment from the activity. The extrinsic factors are also important but they are not the driving force to success. If the self-determination or internal force is not present then other symptoms such as avoidance of social settings (i.e. going to the gym, partaking in group physical exercise, etc.) will cause non-compliance and set the individual up for failure. Essentially, the individual has to find the drive from within to participate. Research within the area "indicates that to be effective, any behavioral intervention intended to improve [physical] exercise compliance must be tailored to the motivational stage of the individual."[164]

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[162]Patrick Milroy and Gary O'Neil, "Factors Affecting Compliance to Chiropractic Prescribed Home Exercise: a Review of the Literature," *Journal of the Canadian Chiropractic Association* 44, no. 3 (2000): 142.

[163]Huberty, J.L., Ransdell, L.B., Sigman, C., Flohr, J.A., Schult, B., Grosshans, O., and Durrant, L. (2008). Explaining Long-Term Exercise Adherence in Women who Complete a Structured Exercise Program. Research Quarterly for Exercise and Sport, 79(3), 374-384, quoted in Len Kravitz, Exercise Motivation: What Starts and Keeps People Exercising? [article on-line]; available from http://www.unm.edu/~lkravitz/Article%20folder/ExerciseMot.pdf; Internet; accessed 25 June 2013.

[164]J.O. Prochaska, and C.C. DiClemente, Towards a Comprehensive Model of Change in Egil W. Martinsen, "Physical Activity in the Prevention and Treatment of Anxiety and Depression," *Nordic Journal of Psychiatry* 64, no. S47 (2008): 27.

Both intrinsic and extrinsic motivational factors play a role in enabling an individual with an OSI to participate in physical exercise, with the follow-on effect of improving their symptoms related to their condition.

The second factor, the mental health condition of the individual, can also have a major impact on compliance of a physical exercise routine. As previously discussed in Chapter Two, individuals with OSIs can have debilitating symptoms such as anxiousness, avoidant behaviors, stress, poor self-esteem and general malaise which can affect their well-being and quality of life and also impede success of a physical exercise program. Levels of symptomatology can effect compliance to a routine. Factors such as avoidance and withdrawal, which are common in patients diagnosed with an OSI, can adversely impact successful outcomes.[165] Therefore, it is important for levels of symptomatology to be assessed prior to embarking on a physical exercise routine. Prior to introducing physical exercise to the treatment process, the clinician has to ensure that the individual's symptoms have been properly identified and diminished. Also, ways for dealing with feelings of avoidance and withdrawal need to be incorporated into the program. Some examples could include " … self-monitoring, structuring and scheduling of daily activities, rating the degree of pleasure and accomplishment experienced during engagement in specific daily activities …"[166] can all help an individual set the grounds for positive outcomes.

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[165]Egil W. Martinsen, "Physical Activity in the Prevention and Treatment of Anxiety and Depression," *Nordic Journal of Psychiatry* 64, no. S47 (2008): 27.

[166]Trevor G. Mazzucchelli, Robert T. Kane and Clare S. Rees, "Behavioral Activation Interventions for Well-Being: A Meta-Analysis," *The Journal of Positive Psychology* 5, no. 2 (March 2010): 106.

Third, the relationship between the clinician and the individual with an OSI is a critical factor. "A significant barrier to effective medical treatment, however, is the patient's failure to follow the recommendations of his or her physician or other healthcare provider."[167] "The interpersonal dynamics of the physician–patient relationship play an important role in determining a variety of patient outcomes including patient adherence to their treatment recommendations."[168] A rapport has to be established and physical exercise should be introduced when appropriate after levels of symptomatology are properly assessed. It is also during this time, while establishing a counselling relationship, that discussions around daily routine and quality of life should be addressed to discern the individual's desire to pursue physical exercise as an adjunct to treatment. The clinician should explore areas of past behaviour in order to see if the individual finds pleasure in physical activities. Determining the individual's success with past physical exercise programs, establishing if the individual is interested in physical exercise, and ascertaining if it has always been a part of their of their daily routine, are all important factors for setting a baseline of success. If the individual states an interest or has exercised regularly in the past, then it should be incorporated in the treatment method.

There are various means to achieving this but generally the individual has to want to intrinsically pursue a physical exercise program and begin to determine the means for achieving success. Some examples for achieving success are as follows, defining the physical activities that would most suit the individual, determining how many times per

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[167]Leslie R. Martin, Summer L. Williams, Kelly B. Haskard, and M Robin DiMatteo, "The Challenge of Patient Adherence," *Therapeutics and Clinical Risk Management* 1, no. 3 (2005): 189.

[168]*Ibid*., 192.

week that the activity will take place, discussing what intensity is appropriate and potentially developing a contract between the clinician and individual to foster accountability. As discussed, the general population is often not successful with all goals associated with a physical exercise regimen; therefore, it is important not to set the individual up for failure. The means to achieving this is to set short-term tangible goals that are achievable. For example, start with a walking routine over a one-two week period of low intensity. This could be for fifteen minutes per session, three times a week, and building over time. The physical exercise goals should start at a basic level with small successes to be motivational as large goals may result in failure at the program which could also compound OSI symptoms.

The fourth factor relates to the social networks of an individual. "Numerous studies show that social support from a significant other or meaningful friend is highly associated with [physical] exercise adherence."[169] For example, an individual with an OSI requires social support not only to aid them through their everyday routine and to help with coping strategies but also to provide an individual with intrinsic motivation. Most people can attest to the fact that a physical exercise routine is easier when they participate with another friend or group. This factor would be even greater for persons diagnosed with an OSI. As stated in Chapter Two, symptoms such as decreased energy, difficulty making decisions, avoidant behaviour, feelings of ineffectiveness, social

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[169]S.G. Trost, N. Owen, A.E. Bauman, J.F. Sallis and W. Brown, "Correlates of Adults' Participation in Physical Activity: Review and Update," *Medicine & Science in Sports & Exercise* 34, no. 12 (2002): 1996-2001 quoted in Len Kravitz, Exercise Motivation: What Starts and Keeps People Exercising? [article on-line]; available from http://www.unm.edu/~lkravitz/Article%20folder/ExerciseMot.pdf; Internet; accessed 25 June 2013.

withdrawal and impaired relationships with others can all impede a person with an OSI. Therefore, it is important that these individuals have a social network to help motivate them to pursue physical activities and assist them in overcoming the previously mentioned barriers.

Finally, it is important to determine the resources available in an individual's community in order to achieve physical exercise goals. It may not always be realistic for an individual to want to partake in organized sports activities or physical exercise programs, therefore, it is worth discussing that even a basic walking or hiking program is a place to start. The individual has to be made aware of what is available in his/her community and that there are alternatives. A discussion around resources is just another means of reducing the barriers and improving compliance.

Overall, Table 3.2 below provides a summary of the key factors that should be included in prescribing a physical exercise program to an individual with an OSI.

Table 3.2 Factors to Ensure Success in the Prescription of Physical Exercise Programs to Persons with an OSI

Factor	Consideration
1. Establish Short-Term Measureable Goals	- Establish a contract that is achievable with measureable goals which include activity (i.e., walking), overall duration of program (i.e., 2 week period), duration of activity (i.e., 15 minutes/session at 3 sessions/week), and intensity (low intensity). - Build on the contract as the individual achieves success.
2. Discuss Success/Failure	- Check-in on individual's success and possibly expect failure in the early stages. - Be diligent in discussing small successes and explore the reason for failures in order to mitigate further occurrence.
3. Discuss Social Network	- Ascertain if the individual has a social network to assist them in their physical exercise routine. If not explore the possibilities.
4. Define Resources	- Determine locations that physical exercise program will take place (mitigate the barriers).

Source: Adapted From – Patrick Milroy and Gary O'Neil, "Factors Affecting Compliance to Chiropractic Prescribed Home Exercise: a Review of the Literature," *Journal of the Canadian Chiropractic Association* 44, no. 3 (2000): 141-148.

Research has shown that "providing clear written and oral instructions" [i.e. measureable goals] will aid in adherence and behavior changes.[170] Other elements that increase compliance are to "ask the patient about adherence at every visit and involve the patient as a partner in the treatment process," which would facilitate discussion around successes and failures.[171] Further research has also shown that behavior change is

[170]Ira S. Ockene, Laura L. Hayman, Richard C. Pasternak, Eleanor Schron, and Jacqueline Dunbar-Jacob, "Task Force #4 - Adherence Issues and Behavior Changes: Achieving a Long-Term Solution," *Journal of the American College of Cardiology* 40, no. 4 (2002): 635-636.

[171]*Ibid*., 636.

influenced on a number of levels; specifically "interpersonal processes" such as social support and social networks.[172]

Generally, it is important to establish short term measureable goals by using a contract which should include the parameters of the physical exercise routine. This should include the activity (i.e. walking), the overall duration of the program (i.e. 2 week period), the duration of the activity (i.e. 15 minutes/session at 3 sessions/week), as well as the intensity (i.e. low intensity). As the individual achieves success the contract should be expanded with the individual identifying areas for an increase in physical exercise parameters. Discussions around successes and failures should be explored; praising successes are important as well as recognizing failure and exploring the barriers in order to mitigate further risk. Third, as mentioned in Table 3.1 it is important to discuss the social networks that the individual has available in order to assist them in achieving success. The reason for including this point within Table 3.2 is to ensure that if the individual does not have a network then there should be a discussion on how one can be attained. Finally, resources have to be defined and planning has to be well defined. Essentially, Table 3.2 provides the detail in each area (goal setting, discussion of successes/failures, social networks and resources) in order for the individual to achieve success.

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[172]*Ibid*., 636.

BENEFITS OF USING PHYSICAL EXERCISE IN ORDER TO MITIGATE THE RISKS OF OSIs

Thus far, this chapter has addressed the impact of physical exercise after a person has been diagnosed with an OSI. However, it is also important to briefly address the impact that physical exercise may have on preventing an OSI. For example, do soldiers that participate in physical exercise prior to a deployment have fewer risk factors of incurring an OSI while on an operational tour? This section will discuss the term resilience and the potential impact that physical exercise can have on preparing a soldier for deployment.

"Resilience reflects the ability to maintain a stable equilibrium."[173] The premise is that if a soldier conducts training (i.e. physical exercise) s/he will be better prepared to deal with the hardships of war, thereby mitigating the risk factors of incurring an OSI. Physical training is only one dimension of resilience training, the remaining factors are beyond the scope of this paper; however, it is worth noting the elements of resilience that physical exercise can play a part in improving and provide some examples. Some of the main factors where there is an association with physical exercise and resilience factors are positive coping, positive thinking, teamwork, and collective efficacy.[174]

First, physical fitness on its own provides a soldier with the capacity to be proficient and capable of physically functioning in an austere environment. If a soldier is

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[173]Geroge A. Bonanno, "Loss, Trauma, and Human Resilience - Have We Underestimated the Human Capacity to Thrive After Extremely Aversive Events?" *American Psychologist,* (January 2004): 20.

[174]Lisa S. Meredith, Cathy D Sherbourne, Sarah Gaillot, Lydia Hansell, Hans V. Ritschard, Andrew M. Parker, and Glenda Wrenn, "Promoting Psychological Resilience in the U.S. Military," *Center for Military Health Research Policy, A Joint Endeavor of Rand Health and The Rand National Defense Institute,* (Santa Monica: Rand Corporation, 2011): 39,42,45,46.

not physically fit prior to deployment his/her abilities to carry-out tasks in an operational setting will diminish which will have an adverse impact, physically and mentally, on the soldier.

Second, physical exercise can have an impact on positive coping, which is defined as the ability to resolve difficult circumstances, deal with stress and devise the means to resolve personal and interpersonal conflict.[175] As mentioned in Chapter Two, physical exercise can induce a positive mind-set and reduce stress which can assist a soldier on deployment and ensure positive coping mechanisms.

Third, positive thinking, which is defined as "making sense out of a situation… a positive outlook, and psychological preparation," may be associated with increased physical exercise. [176] Earlier in the paper it was stated that physical exercise "may contribute to improved mood and increased self-esteem, self-confidence and sense of control."[177] Therefore, there is an association between physical exercise and positive thinking. Physical exercise also can induce the release of neurotransmitters which aid in achieving positive thoughts and altering one's mood. Therefore, there is an association between physical exercise and positive thinking.

Fourth, team cohesion can be built from physical exercise. Cohesion is the ability of a unit to work collectively, carry-out tasks in an orchestrated manner while remaining

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[175]*Ibid*., xiv.

[176]*Ibid*., xiv.

[177]Alberta Healthy Living Network, *Common Messages for Mental Health & Active Living* (Edmonton, Alberta: Alberta Centre For Active Living, 2008), 2.

committed to each other and achieving a common mission.[178] Group physical exercise prior to deployment is very conducive to building a team environment and promoting esprit de corps. The ability for a unit to participate in team sports prior to a mission builds a common goal and fosters many of the aspects of cohesion thereby contributing to a solid unit while on mission.

Finally, collective efficacy is increased through group physical exercise. Research has shown that "the more one perceives their team as working together to achieve common goals, the more confidence one should have in the team's capability to successfully perform tasks that require a high degree of coordination and teamwork."[179]

Overall, operational tours can be very demanding; the ability of a unit to increase its resilience is paramount. Resilience is essentially the ability to adapt in adverse situations and physical exercise is one means of contributing to the psychological and physical requisites to deal with the hardships of a mission.

PHYSICAL EXERCISE COMPARISON WITH PSYCHOLOGICAL AND PHARMACOLOGICAL TREATMENT

Physical exercise can have a positive impact on reducing the symptoms of OSIs; however, there are still very few programs that use physical exercise as a formal adjunct to treatment. "Despite the growing body of evidence, supporting the relationship between

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[178]Lisa S. Meredith, Cathy D Sherbourne, Sarah Gaillot, Lydia Hansell, Hans V. Ritschard, Andrew M. Parker, and Glenda Wrenn, "Promoting Psychological Resilience in the U.S. Military," *Center for Military Health Research Policy, A Joint Endeavor of Rand Health and The Rand National Defense Institute,* (Santa Monica: Rand Corporation, 2011): xv.

[179]Stephen A. Kozub and Justine F. McDonnell, "Exploring the Relationship Between Cohesion and Collective Efficacy in Rugby Teams," *Journal of Sport Behavior* 23, no. 2 (2000): 126.

[physical] exercise and mental health, organisations have been reluctant to endorse the use of [physical] exercise in treating mental illness."[180] Currently, physical exercise routines are not used a great deal in the treatment of mental health illnesses.[181] The cost of psychological treatments along with medical prescriptions is high, therefore, it is imperative to consider other adjuncts to treatment such as physical exercise to reduce costs yet still have a positive impact on OSI outcomes.

There are a number of factors to consider when determining the benefits of physical exercise over more accepted means of treatment for OSIs. Taylor and Faulkner have proposed four areas of interest that merit consideration for the incorporation of physical exercise as an adjunct or even as a sole treatment for mental health conditions.

First, physical "exercise does not add additional costs if used as an adjunct to psychopharmacological or psychotherapeutic interventions."[182] Some programs may require more resources (i.e., gym membership); physical exercise can be relatively low cost. For example, within the CAF all members have free access to a fitness facility as well as many opportunities for augmented memberships in the community.

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[180]Amanda J. Daley, "Exercise Therapy and Mental Health in Clinical Populations: Is Exercise Therapy a Worthwhile Intervention?" *Advances in Psychiatric Treatment* 8, (2002): 262.

[181]Amanda J. Daley, "Exercise Therapy and Mental Health in Clinical Populations: Is Exercise Therapy a Worthwhile Intervention?" *Advances in Psychiatric Treatment* 8, (2002): 262.

[182]G. Faulkner and Taylor, A., editors. (2005). *Exercise, Health and Mental Health: Emerging Relationships*. (London: Routledge, 2005), quoted in Quoted in Canadian Mental Health Association, compiled by Paula Bude Bingham, "Minding our Bodies Physical Activity and Mental Health Literature Review," http://www.mindingourbodies.ca/ about_the_project/literature_reviews/physical_activity_and _mental_health; Internet; accessed 23 March 2013.

Second, "in contrast to pharmacological interventions, [physical exercise] is associated with minimal adverse side-effects."[183] Although there is the potential for injury with physical exercise, such as musculoskeletal injuries, it can be argued that these do not outweigh pharmacological side-effects. Whereas the side-effects of medication such as feeling disengaged or detached within social settings, the possibility of intensifying adverse symptoms or becoming reliant on the prescription are all adverse concerns that are not present with physical exercise. Many of the psychological benefits of physical exercise have been discussed earlier in the paper. Improvements in self-esteem, quality of life, and well-being have all been shown to improve with physical exercise. There are fewer side effects and repercussions of using physical exercise as an adjunct to accepted treatments for OSIs. It is also important to note that physical exercise can be useful in the management of persons that do not respond well to medication.[184]

Third, "physical activity can be indefinitely sustained by the individual, unlike pharmacological and psychotherapeutic treatments, which often have a specified endpoint."[185] Physical exercise can be part of a person's everyday routine without adverse impact and can be a real mechanism of treatment over an individual's lifespan.

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[183]*Ibid.*

[184]Mandhukar H. Trivedi, Tracy L. Greer, Timothy S. Church, Thomas J. Carmody, Bruce D. Grannemann, Daniel I. Galper, Andrea L. Dunn, Conrad P. Earnest, Prabha Sunderajan, and Steven S. Henley, Steven N. Blair, "Exercise as an Augmentation Treatment for Nonremitted Major Depressive Disorder: A Randomized, Parallel Dose Comparison," *Journal of Clinical Psychiatry* 72, no. 5 (2011): 683.

[185]*Ibid.*

Finally, physical exercise can have multiple positive impacts in comparison to the accepted psychological treatment for OSIs, since it can improve a person's mental health as well as physical health, which cannot be said about medication.[186]

Due to all the potential positive benefits of using physical exercise to help treat OSI, there is impetus to conduct further research within this area. Additional research in the area may also begin to change the mindset around using physical exercise not only as an adjunct but potentially as a sole form of treatment for OSIs.

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[186] *Ibid.*

CHAPTER 4 – IMPLICATIONS OF THIS RESEARCH ON THE CAF CULTURE

It has been established that OSIs are a mental health concern for soldiers that return from operational deployment. It has also been shown that physical exercise can have a positive impact on pre-deployment readiness as part of resilience training and that physical exercise can act as an adjunct to treatment for individuals that are diagnosed with an OSI. Realizing that OSIs are a relatively significant problem within the CAF; how do we incorporate physical exercise into treatment methodologies for OSIs?

The aim of this chapter is to link physical exercise as an adjunct to treatment back to the CAF culture and discuss how we can further incorporate it within the military. The chapter will first discuss the CAF culture and what it means to try and change values, attitudes, beliefs, and behaviors with respect to physical exercise and OSIs. Second, the chapter will discuss stigma and how military members with an OSI are integrated back into the CAF after they have been diagnosed with a mental health condition. Third, the chapter will discuss how the research within this paper can be interpreted in order to have an effect on the CAF and stimulate change including the importance of a having proactive system in place.

CAF CULTURE - CHANGING ATTITUDES TOWARD OSI TREATMENT METHODOLOGIES

"Culture is a key concept for helping us to understand change in military organizations."[187] The CAF has a culture which is defined by such things as history and

[187]Allan D. English, "Understanding Military Culture: A Canadian Perspective," (Ottawa: National Defence 2004), 10.

heritage, ethics and values, and social norms. CAF members are indoctrinated into a military culture through basic training, career courses, deployments and group interactions such as group physical exercise and social functions. Through this indoctrination, members share a model of common behavior and values that "is learned over time as an effective means of maintaining internal social stability."[188] The components of that common behavior can be defined through culture which is based on an understanding of values, attitudes, beliefs and behaviors.[189]

"Values are beliefs concerning what is centrally important in life and what should, therefore, guide decisions and actions: properties or qualities that make something useful, desired or esteemed."[190] Typical values within the CAF are integrity, loyalty, courage, stewardship and excellence.[191]

"Attitudes have been defined as a fairly stable emotional tendency to respond consistently to some object, situation, person or category or people."[192] Attitudes within the CAF are shaped by the experience a soldier incurs while in the military and the military norms that are introduced and maintained through positive leadership. For

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[188]Department of National Defence, A-PA-005-000/AP-004 *Leadership in the Canadian Forces: Conceptual Foundations* (Kingston, ON: Canadian Forces Leadership Institute, 2005), 129.

[189]Allan D. English, "Understanding Military Culture: A Canadian Perspective" (Ottawa: National Defence 2004), 10.

[190]Department of National Defence, A-PA-005-000/AP-004 *Leadership in the Canadian Forces: Conceptual Foundations* (Kingston, ON: Canadian Forces Leadership Institute, 2005), 133.

[191]National Defence and the Canadian Forces, "DND/CF Code of Ethics and Values," http://www.ped.forces.gc.ca/dep-ped/code/code-eng.aspx#_ftn1; Internet; accessed 5 May 13.

[192]Gary Johns and Alan M. Saks, *Organizational Behavior Understanding and Managing Life at Work* (Toronto: Prentice Hall, 2011) quoted in Allan D. English, "Understanding Military Culture: A Canadian Perspective" (Ottawa: National Defence, 2004): 12.

example, most soldiers have a positive attitude toward physical exercise as they realize it is an important construct which enables them to complete military tasks and a requirement of military job specifications. If a soldier does not maintain this attitude toward physical exercise then s/he is in jeopardy of not achieving the fitness requirements for their duties and may result in release from the CAF.

Beliefs are "something one accepts as true or real; a firmly held opinion:"[193] Beliefs are influential and can affect a person's actions. For example, a soldier may believe that if he or she seeks professional mental health counselling in order to deal with an OSI then his or her career will be adversely affected. A soldier's beliefs are shaped through socialization with other military members and direction that is provided by the leadership of the CAF. If a soldier believes that physical exercise is important and an integral part of the CAF culture then s/he will strive to achieve the fitness requirements in order to function at the optimum level.

"Behaviours are the way in which one acts or conducts oneself or the way in which an animal or person behaves in response to a particular situation or stimulus."[194] For example, if a soldier suffers with an OSI and he or she believes this could adversely affect his or her career, his/her behaviour will be affected due to the additional anxiety or guilt of the condition. This is the stigmatization of being diagnosed with an OSI which will be discussed within this chapter.

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[193]Oxford Dictionary, http://oxforddictionaries.com/definition/english/belief; Internet; accessed 24 May 2013.

[194]Oxford Dictionary, http://oxforddictionaries.com/definition/english/belief; Internet; accessed 24 May 2013.

Physical exercise in the CAF is valued and associated with improvements in physical strength. However, it is not recognized for the value it may have on positively impacting an individual's mental health, and less so, as an adjunct in the treatment of OSIs. Physical exercise is accepted as being very much a part of the CAF culture for the physical benefits that it provides. For example, most military units conduct daily physical training because it improves a soldier's physical capacity and enables him/her to complete tasks that require physical strength. There is also the belief that physical exercise, when conducted in a group dynamic, builds unit cohesion and increases esprit de corps among CAF members. Within the roles of the CAF, soldiers are expected to maintain their health and units are expected to be combat-capable in order to deploy and provide support when needed. This value is essentially focused on the physical benefits of physical exercise and not the mental health advantages. So, how do we change this attitude and recognize that physical exercise can have an impact on mental health and could also be used in helping soldiers diagnosed with an OSI?

A change in CAF culture means a change about accepting the impact of physical exercise on mental health and psychological well-being, which would include physical exercise as an adjunct to OSI treatment. In order to integrate physical exercise into mental health treatment methodologies, the CAF culture has to change. This would require the implementation of a vision from the leadership along with buy-in from organizations that are able to provide support to persons with OSIs. This will be discussed in a subsequent section of this chapter, building on the research within this paper, to address how to stimulate change regarding physical exercise and treatment of OSIs.

THE STIGMA OF AN OSI

Some individuals suffer with an OSI for years before they come forward because they may think that they will be stereotyped and their life as a soldier may change even to the point where they are released from the military. In order to change the stigma attached to an OSI, attitudes, beliefs, values and behaviors need to change within the CAF.

A major barrier in changing CAF culture around the importance of physical exercise as an adjunct to treatment of OSIs is the stigma surrounding mental health issues in general. One of the most difficult issues concerning OSIs is the stigma attached to such a diagnosis. The stigma of an OSI is linked with the negative stereotypes of OSIs, such as the potential discrimination that may follow one's diagnosis.[195] For example, after an individual admits to having a problem s/he may fear being ostracized from their unit and lose the social support they require to help overcome their illness. Currently, many soldiers that are diagnosed with an OSI are transitioned to the Joint Personnel Support Unit (JPSU). The aim of the JPSU is to provide effective leadership, supervision and administrative support to personnel during recovery and rehabilitation.[196] JPSU provides a soldier with "consistent personal and administrative support during all phases of recovery, rehabilitation, and reintegration on return to service or transition following release…"[197] However; when a soldier is posted to this Unit s/he becomes detached from

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[195]Thomas W. Britt, "The Stigma of Mental Health Problems in the Military," M*ilitary Medicine* 172, no. 2 (2007): 157.

[196]National Defence and the Canadian Forces, "About Joint Personnel Support Unit," http://www.cmp-cpm.forces.gc.ca/jpsu-uisp/ajp-sui/index-eng.asp; Internet; accessed 17 Jun 13.

[197]*Ibid.*

their original unit where they had a network of friends and a support system in place. A posting to the JPSU can have an adverse effect as many of the soldiers had strong affiliations and ties to their original unit. Once posted to the JPSU, an individual with an OSI may feel that they have been stigmatized due to their mental health illness and are no longer part of the CAF. As a result, individuals may be less likely to seek treatment for their illness, or if they are in treatment, they may be less likely to do the work to get better, thereby reducing the likelihood of a positive outcome. They may also seek treatment outside the CAF environment, incurring bills that might put unnecessary financial burden on them and their families.

In order to change the stigma attached to an OSI, attitudes, beliefs, values and behaviors need to change within the CAF. There are a number of reasons why institutions fail to implement a change in culture. Some of the main explanations are that institutions allow too much complacency, there is lack of communication and direction on the vision for change, and finally, the organization does not anchor the change within their culture.[198] The CAF culture has positively changed a great deal over the last twenty years and the stigma surrounding OSIs has lessened, but our military still has areas that need to be developed in order to attempt to retain some of the soldiers diagnosed with an OSI, because it is a disservice to them if they are transitioned too early to the civilian sector. Establishing a heightened emphasis in the CAF on the psychological benefits of physical exercise may help transition people to thinking more about psychological well-being and the role of physical exercise. More effort has to be asserted to provide a heightened level

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[198]Department of National Defence, A-PA-005-000/AP-004 *Leadership in the Canadian Forces: Conceptual Foundations* (Kingston, ON: Canadian Forces Leadership Institute, 2005), 108.

of care that is consolidated between Canadian Forces Health Services (CFHS) Mental Health Programs, Personnel Support Programs (PSP), the Operational Trauma and Stress Support Centres (OTSSC) and JPSU to ensure personnel do not slip through the cracks and become a news headline.

LINKING RESEARCH WITHIN THIS PAPER AND THE EFFECT ON THE CAF TO STIMULATE CHANGE

As previously demonstrated in the thesis, physical exercise can have a substantial impact on an individual's mental health. Currently, within the CAF, physical exercise is not normally used as an adjunct to treatment for OSIs. Although, some clinicians do incorporate it into their treatment regimen, it is not the norm. Research within the area has shown the positive impact on depression, PTSD and anxiety; therefore, the utilization of physical exercise needs to be promoted within CAF treatment methodologies. Physical exercise is already highly valued within the CAF culture for the physical benefits and so it should not be a stretch to promote the possibilities within the mental health realm.

It should be possible to introduce physical exercise as an adjunct to treatment methodologies through the CFHS Mental Health Programs. Partnerships between the CFHS Mental Health clinicians, PSP, OTSSCs and JPSUs could be adapted across CAF bases, as well as within the OTSSC centres located across Canada. These partnerships would employ the key people that have a role in helping soldiers with OSIs. The CFHS Mental Health clinicians are already immersed in the treatment of soldiers with OSIs through various treatment methodologies previously defined in this paper. PSP are responsible for enhancing the morale and welfare of the CAF community through various

means, such as physical fitness, recreation and health promotion.[199] The OTSSCs are involved with treatment and outreach for persons with PTSD.[200] Generally, all of these programs need to work in greater conjunction with one another in order to provide a consolidated approach to treatment.

This type of initiative would have to be promoted by the leadership of the CAF along with buy-in from CFHS, PSP, OTSSCs and the JPSUs. In order to ensure that a change of culture and mindset is possible within the CAF, our leadership has to provide a clear vision, and consistent application of that vision, in order to ensure that our military is achieving the best possible care for soldiers with OSIs. The CAF already has a vested interest in providing care for soldiers with OSIs but there are still barriers to care as there are still members of our military that have values, attitudes and beliefs that are not conducive to providing proper care to CAF soldiers.

It is also important for the CAF to be proactive in treating persons with OSIs. The utilization of physical exercise within treatment methodologies is not the norm but based on research it may be worth implementing as an adjunct to treatment.
What do we have to lose? The military currently incorporates physical exercise into pre-deployment training to build resilience which is geared toward the maintenance of a positive mental health state. It would therefore stand to reason that we use some of the same rationale in treating persons with mental health conditions through physical exercise. Also, there is an argument regarding cost effectiveness. The CAF spends a lot

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[199]CFMWS Website, "About CFMWS," https://www.cfpsa.com/en/aboutus/psp/pages/default.aspx; Internet; accessed 10 Jun 13.

[200]National Defence and the Canadian Forces, "Mental Health Services in the CF," http://www.forces.gc.ca/site/news-nouvelles/news-nouvelles-eng.asp?id=4374; Internet; accessed 4 Jun 13.

of money training its members; it is a waste of money not to create the conditions that facilitate their physical and psychological health to set the stage for higher retention of those members. Finally, there is also a moral argument; the CAF puts soldiers in harm's way and, therefore, we have the moral obligation to protect them physically and psychologically to the best of our ability.

As previously mentioned, a change in culture has to be promoted by our leadership and the partnerships between the organizations (CFHS, PSP, OTSSC and JPSU) responsible for the provision of care have to carry the momentum of working together to treat soldiers with OSIs. In order to bring about change, the partnered organizations have to be proactive to utilize physical exercise as an adjunct to treatment. Currently, within the CF there are initiatives such as the Soldier On Program that "facilitates, supports, and integrates resources and opportunities for ill and injured military personnel to fully and actively participate in physical fitness, recreation, and sport activities."[201] It is initiatives such as these that utilize physical exercise to assist in the recovery of soldiers that have incurred hardships due to their military service. The CAF culture is open to these types of initiatives; therefore, using physical exercise as an adjunct to treatment within the healthcare setting could be a formidable means to positive outcomes for soldiers with OSIs.

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[201]Soldier On Website, "The Soldier On Program," http://www.qcccanada.com/downloads/troops/Soldier %20On.pdf; Internet; accessed 17 Jun 13.

CHAPTER 5 - CONCLUSION

The purpose of this thesis was to show that there is significant evidence that physical exercise is a beneficial approach that can be an adjunct to treatment for OSIs within the CAF.

The paper first provided a historical review of OSIs and then defined the three main types of OSIs (depression, PTSD and anxiety) found among soldiers that deploy on operational missions. The second chapter focused on the psychological benefits of physical exercise which included a literature review on the impact of physical exercise on OSIs. Chapter Three provided a rationale as to why physical exercise should be used as a compliment to treatment methods for OSIs. Finally, the paper concluded by linking the research within this thesis to the CAF culture and the potential for using physical exercise as a treatment for OSIs.

In Chapter One, the historical perspective on OSIs showed that depression, PTSD and anxiety have always been a part of operational deployments and that OSIs are not a new or recent phenomenon. Whether coined 'cerebro-spinal shock,' 'hysteria,' or 'neurasthenia' in the Napoleonic Wars and throughout the 1800s, 'shell shock' in WW1, 'combat neurosis,' 'operational fatigue,' or 'combat exhaustion' in WWII, or 'stress response syndrome' in Vietnam or 'Gulf War Syndrome', OSIs have been prominent throughout history.[202,203,204,205]

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[202]Edgar Jones and Simon Wessely, *Shell Shock to PTSD, Military Psychiatry from 1900 to the Gulf War* (New York: Psychology Press, 2005), 2.

[203]Susan L. Ray, "Evolution of Post-traumatic Stress Disorder and Future Directions," *Archives of Psychiatric Nursing* 22, no.4 (August 2008): 218.

Chapter One also provided an overview of OSIs and discussed the three main conditions (depression, PTSD and anxiety) that are the most predominant in soldiers returning from operational deployments and that are often co-morbid (defined as the "simultaneous presence of two chronic diseases or conditions").[206] The chapter outlined treatment methods for the three main conditions which are similar using methodologies such as CBT, Interpersonal Therapy, and other evidence based treatments. The prevalence for OSIs was also provided; 13.2% of CAF soldiers deploying to Afghanistan, 15.6-17.1% for US soldiers in Iraq and 11.2% for US soldiers in Afghanistan.[207, 208] Overall, Chapter One showed that OSIs are prevalent for soldiers deploying on operational missions and quite commonly there will also be a co-morbid disorder such as anxiety or depression that adversely contributes to the condition.

Chapter Two demonstrated that physical exercise does have a positive impact on the symptoms of OSIs. For example, there was evidence that "suggests that physical activity may contribute to improved mood and increased self-esteem, self-confidence and

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[204]G.C. Lasiuk, and K.M Hegadoren, "Posttraumatic Stress Disorder Part I: Historical Development of the Concept Perspectives," *Psychiatric Care* 42, no.1 (February 2006): 23.

[205]Bradley D. Grinage, "Diagnosis and Management of Post-traumatic Stress Disorder," *American Family Physician*, 15, no.12 (Dec 2003): 2401.

[206]Oxford Dictionary, http://oxforddictionaries.com/us/definition/_english/comorbidity; Internet; accessed 18 Jan 13.

[207]Department of National Defence, *Cumulative Incidence of Post-Traumatic Stress Disorder (PTSD) and Other Mental Disorders in Canadian Forces Personnel Deployed in Support of the Mission in Afghanistan, 2001-2008* , [report on-line]; available from http://forces.gc.ca/health-sante/ps/mh-sm/osi-bso/sum-som-eng.asp; Internet; accessed 10 Sep 12.

[208]Charles W. Hoge, Carl A. Castro, Stephen C. Messer, Dennis McGurk, Dave I. Cotting, and Robert L. Koffman, "Combat Duty in Iraq and Afghanistan, Mental Health Problems and Barriers to Care," *New England Journal* of Medicine 351, no. 1, (2004): 13.

sense of control."[209] This chapter also established that physical exercise have a positive impact on depression, PTSD and anxiety; as well as the psychological impacts related to stress levels and feelings related to self-esteem, well-being and quality of life.

Chapter Three provided a rationale as to why and how physical exercise should be used as an adjunct to treatment methods for OSIs. The chapter first differentiated between physical exercise programs and discussed typical routines (i.e. modes, duration and level of physical intensity). The next section within the chapter addressed some of the main factors that have an impact on achieving success within a physical exercise program; specifically, motivation and compliance. Both terms were defined and the importance of each was outlined by stating that these factors play a role in enabling an individual with an OSI to participate in physical exercise, with the follow-on effect of improving their symptoms related to their mental health condition. Table 3.1 (Factors that Affect Compliance to Physical Exercise Programs for Persons with OSIs) outlined self-determination, mental health condition, communication between clinician and individual, social network, and resources within the community as all important factors to be taken into consideration when developing physical exercise programs for persons with OSIs. Table 3.2 (Factors to Ensure Success in the Prescription of Physical Exercise Programs to Persons with an OSI) outlined the importance of establishing short-term measureable goals, discussing successes/failures/social network, and defining resources within the community in order to set the groundwork for success for soldiers using physical exercise as an adjunct to treatment. Resilience was also discussed in this chapter and it was shown

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[209]Alberta Healthy Living Network, *Common Messages for Mental Health & Active Living* (Edmonton, Alberta: Alberta Centre For Active Living, 2008), 2.

that related training can have a constructive impact on positive coping, positive thinking, teamwork and collective efficacy.[210] Generally, resilience training, which includes physical exercise, was shown to enable soldiers to develop coping mechanisms and adapt to adverse situations while on operational missions. Finally, the chapter noted that "despite the growing body of evidence, supporting the relationship between physical exercise and mental health, organisations have been reluctant to endorse the use of physical exercise in treating mental illness."[211] This section showed that physical exercise is more cost effective than other conventional treatments (i.e. medication and counselling), is associated with minimal adverse side-effects, can be sustained over a life span, and can have multiple positive impacts in comparison to the accepted psychological treatment for OSIs.[212]

Finally, Chapter Four stated that in order to change the CAF culture surrounding OSIs we have to change our beliefs, attitudes, values and behaviors with respect to treatment methods for OSIs. A change in CAF culture has to start with the implementation of a vision from the leadership along with buy-in from organizations such as CFHS, PSP, OTSSC and the JPSU. The chapter also discussed the importance of

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[210]Lisa S. Meredith, Cathy D Sherbourne, Sarah Gaillot, Lydia Hansell, Hans V. Ritschard, Andrew M. Parker, and Glenda Wrenn, "Promoting Psychological Resilience in the U.S. Military," *Center for Military Health Research Policy, A Joint Endeavor of Rand Health and The Rand National Defense Institute*, (Santa Monica: Rand Corporation, 2011): 39,42,45,46.

[211]Amanda J. Daley, "Exercise Therapy and Mental Health in Clinical Populations: Is Exercise Therapy a Worthwhile Intervention?" *Advances in Psychiatric Treatment* 8, (2002): 262.

[212]G. Faulkner and Taylor, A., editors. (2005). *Exercise, Health and Mental Health: Emerging Relationships*. (London: Routledge, 2005), quoted in Quoted in Canadian Mental Health Association, compiled by Paula Bude Bingham, "Minding our Bodies Physical Activity and Mental Health Literature Review," http://www.mindingourbodies.ca/ about_the_project/literature_reviews/physical_activity_and_ mental_health; Internet; accessed 23 March 2013.

overcoming both the stigma associated with OSIs, as well as the stigmatization of soldiers diagnosed with an OSI. This can be achieved through a robust and heightened level of care consolidated between the aforementioned organizations in order to ensure that personnel with an OSI do not slip through the cracks. The CAF culture has changed over the last twenty years with respect to the way it understands OSIs but soldiers still are apprehensive to step forward and admit to a mental health illness; this has to change in order for them to get the care they need to recover. It was also stated within the chapter that physical exercise is already engrained into the CAF culture for its physical merits as well as within resilience training; therefore, it should be considered for addressing mental health issues as well.

Although not the norm within treatment methodologies, this research has shown the positive impact that physical exercise can have on depression, PTSD and anxiety. The utilization of such a physical exercise-mental health paradigm needs heightened awareness within the CAF and should be considered as a legitimate adjunct to OSI treatment.

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