

# **Preliminary Evaluation of an Approach to Rehabilitation Aimed at Promoting Return-to-Work in Individuals with Co-Morbid Musculoskeletal Pain and Depression**

Michael J. L. Sullivan  
Timothy Wideman  
Aliko Thomas

STUDIES AND  
RESEARCH PROJECTS

R-1044

## OUR RESEARCH is working for you !

**The Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST), established in Québec since 1980, is a scientific research organization well-known for the quality of its work and the expertise of its personnel.**

### **Mission**

To contribute, through research, to the prevention of industrial accidents and occupational diseases and to the rehabilitation of affected workers;

To disseminate knowledge and serve as a scientific reference centre and expert;

To provide the laboratory services and expertise required to support the public occupational health and safety network.

Funded by the Commission des normes, de l'équité, de la santé et de la sécurité du travail, the IRSST has a board of directors made up of an equal number of employer and worker representatives.

### **To find out more**

Visit our Web site for complete up-to-date information about the IRSST. All our publications can be downloaded at no charge.

[www.irsst.qc.ca](http://www.irsst.qc.ca)

To obtain the latest information on the research carried out or funded by the IRSST, subscribe to our publications:

- *Prévention au travail*, the free magazine published jointly by the IRSST and the CNESST ([preventionautravail.com](http://preventionautravail.com))
- [InfoIRSST](#), the Institute's electronic newsletter

### **Legal Deposit**

Bibliothèque et Archives nationales du Québec  
2019

ISBN : 978-2-89797-078-9

ISSN : 0820-8395

IRSST – Communications and Knowledge Transfer

Division

505 De Maisonneuve Blvd. West

Montréal, Québec

H3A 3C2

Phone: 514 288-1551

[publications@irsst.qc.ca](mailto:publications@irsst.qc.ca)

[www.irsst.qc.ca](http://www.irsst.qc.ca)

© Institut de recherche Robert-Sauvé  
en santé et en sécurité du travail,  
October 2019

# **Preliminary Evaluation of an Approach to Rehabilitation Aimed at Promoting Return-to-Work in Individuals with Co-Morbid Musculoskeletal Pain and Depression**

Michael J. L. Sullivan, Timothy Wideman, Alik Thomas

Université McGill

STUDIES AND  
RESEARCH PROJECTS

R-1044



## **Disclaimer**

The IRSST makes no guarantee as to the accuracy, reliability or completeness of the information in this document.

Under no circumstances may the IRSST be held liable for any physical or psychological injury or material damage resulting from the use of this information.

Document content is protected by Canadian intellectual property legislation.

A PDF version of this publication is available on the IRSST Web site.





PEER REVIEW

In compliance with IRSST policy, the research results published in this document have been peer-reviewed.

## **ACKNOWLEDGEMENTS**

The authors would like to thank the rehabilitation professionals who provided clinical services for this project. The authors also extend special thanks to Dr. Nathalie Gauthier, who provided clinical supervision for the project, and Dr. Pascal Thibault for his unwavering dedication to ensuring successful execution of the project. Finally, the authors thank Ms. Emilie Lukian and Stephania Donayre for their assistance in conducting literature reviews, data coding and data entry, preparation of material for the dissemination of findings and the final report.



## SUMMARY

Many individuals who have sustained injuries in the workplace will experience symptoms of pain as well as symptoms of depression. The combination of pain and depressive symptoms can have a negative impact on recovery. The presence of depressive symptoms can interfere with an individual's ability to engage in many important activities of daily living, including occupational activities. Studies have shown that injured workers with depressive symptoms will be absent from work twice as long as injured workers without depression. Interventions that have been used to treat pain and disability in injured workers are much less effective when the injured worker is also experiencing symptoms of depression. Many clinicians and researchers have called for the development and evaluation of treatments specifically designed to meet the needs of injured workers who are experiencing symptoms of pain and depression.

The present study was designed to evaluate the feasibility and impact of an intervention specifically designed to meet the needs of injured workers experiencing symptoms of pain and depression. The intervention that was evaluated in this study is referred to as the 'Progressive Goal Attainment Program' (PGAP). The intervention contains a wide range of techniques designed to increase activity involvement, improve mood, and assist the injured worker in returning to work. In this intervention, the injured worker meets with a specially trained rehabilitation professional for one hour each week, for a maximum of 10 weeks.

In order to recruit participants for this study, advertisements were placed in newspapers, on the radio and in rehabilitation clinics in the greater Montreal region. A total of 57 injured workers (43 men, 14 women) experiencing symptoms of pain and depression volunteered to participate in the study. The majority of participants successfully completed the intervention. Only 9 participants (17%) discontinued the intervention prematurely either due to lack of interest, medical complications or geographical distance.

The average age of participants was 41 years of age. The majority of participants were married or living common-law and had completed at least 12 years of schooling. On average, participants had been absent from work for approximately 6 months when they enrolled in the study.

Participation in PGAP led to many positive changes. At the end of the intervention, participants were more optimistic about their situation and their health condition, and they were less worried about engaging in physical activities. Participants also reported that their pain had decreased and their mood had improved. Participants reported that the intervention program had improved their quality of life and the majority of participants indicated that they were either 'very' or 'extremely' satisfied with the treatment they received.

When contacted 6 months after the end of treatment, 58% of participants indicated that they had returned to work. In the absence of a control group, it is not possible to make confident statements about the degree to which return to work outcomes were influenced by the intervention. Epidemiological studies suggest that, for individuals who have been work-disabled for 3 months, approximately 40% will return to work; for individuals who have been work-disabled for 6 months, only 25% will return to work. Return to work rates are even lower in

injured workers who also suffer depression. Considering that the mean duration of work disability in the current sample was 6 months, the observed return to work rates would be considered a positive outcome.

Although the outcome of the study would be considered positive, some degree of caution must be exercised in the interpretation of the findings. Given the modest sample size, it was not possible to control for all extraneous factors (e.g., concurrent treatment, previous treatment history, employment sector) that might have influenced the probability of returning to work. It is also important to note that the participants in the intervention were volunteers. It is possible that people who volunteer for research studies might be especially motivated to improve and return to work. This might not be true of all injured workers.

Implementation challenges must also be considered. The skills that are required to deliver the intervention are not taught in the clinical training programs of rehabilitation professionals. The clinicians that provided services for this study received specialized training to acquire the skills necessary to deliver the intervention. Attempting to make this specialized training available to rehabilitation professionals across the province would be challenging and costly.

One possible avenue to consider would be to evaluate the effectiveness of a tele-health version of the intervention. By using a tele-health model of service delivery, only a small number of rehabilitation professionals would need to be trained. A tele-health model of service delivery would also increase access to services for injured workers who live in rural or remote communities. Also important is that a tele-health model of service delivery would be associated with lower costs than services provided through rehabilitation clinics.

In conclusion, the results of this study suggest that PGAP can contribute to clinical improvement and return to work in injured workers with symptoms of pain and depression. The majority of participants indicated they were satisfied with the treatment they received and that their quality of life had improved. Greater accessibility of interventions such as the one tested in this study could improve the recovery outcomes of injured workers experiencing symptoms of pain and depression. The results of the study warrant consideration of testing the effectiveness of PGAP within a controlled clinical trial.

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS</b> .....	<b>I</b>
<b>SUMMARY</b> .....	<b>III</b>
<b>LIST OF TABLES</b> .....	<b>VII</b>
<b>ACRONYMS AND ABBREVIATIONS</b> .....	<b>IX</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
<b>2. CURRENT STATE OF KNOWLEDGE</b> .....	<b>3</b>
2.1 Psychosocial Risk Factors for Delayed Recovery .....	3
2.2 Targeting Pain-Related Psychosocial Risk Factors for Delayed Recovery .....	4
2.2.1 The Progressive Goal Attainment Program (PGAP) .....	5
<b>3. RESEARCH OBJECTIVES</b> .....	<b>9</b>
<b>4. METHODS</b> .....	<b>11</b>
4.1 Study Population.....	11
4.1.1 Selection Criteria .....	11
4.2 Recruitment .....	11
4.3 The Essential Techniques of PGAP .....	11
4.4 The Clinicians .....	14
4.5 Pain-Related Psychosocial Risk Measures .....	14
4.5.1 Pain Catastrophizing .....	14
4.5.2 Fear of Movement .....	15
4.5.3 Perceived Injustice .....	15
4.6 Outcome Measures.....	15
4.6.1 Pain Severity .....	15
4.6.2 Depression .....	15
4.6.3 Post-Traumatic Stress Symptoms .....	16
4.6.4 Self-Reported Disability .....	16
4.6.5 Return to Work Expectancies .....	16
4.6.6 Return to Work .....	16
4.6.7 Quality of Life .....	16
4.7 Process and Acceptability Measures .....	17
4.7.1 Clinician Fidelity to Treatment Protocol.....	17
4.7.2 Acceptability of Treatment .....	17

4.7.3	Treatment Satisfaction.....	17
4.7.4	Clinicians Reflections on Clients' Treatment Experience .....	17
4.8	Data Analytic Approach .....	17
<b>5.</b>	<b>RESULTS .....</b>	<b>19</b>
5.1	Sample Characteristics .....	19
5.2	Past and Current Treatment.....	20
5.3	Acceptability of Treatment.....	20
5.3.1	Agreement to Watch the PGAP Information Video .....	21
5.3.2	Agreement to Participate in the Intervention after Having Watched the PGAP Information Video .....	21
5.3.3	Proportion of Participants who Successfully Completed the Intervention .....	21
5.3.4	Treatment Satisfaction.....	21
5.3.5	Clinicians' Reflections on Participants' Treatment-Related Experiences .....	21
5.3.6	Clinician Fidelity to Treatment Protocol.....	22
5.4	Clinical Effectiveness .....	23
5.4.1	Changes in Psychosocial Risk Factors .....	23
5.4.2	Changes on Measures of Symptom Severity .....	23
5.4.3	Changes in Quality of Life.....	24
5.4.4	Correlations Between Change Scores on Risk and Symptom Measures .....	25
5.5	Occupational Relevance .....	26
5.6	Predictors of Improvement and Return to Work .....	27
5.6.1	Predicting Reductions in Self-Reported Disability .....	27
5.6.2	Predicting Increases in Return to Work Expectancies.....	28
5.6.3	Predicting Return to Work.....	29
5.6.4	Predicting Improvement in Quality of Life (SF Physical Function) .....	30
5.6.5	Predicting Improvement in Quality of Life (SF Mental Health).....	31
<b>6.</b>	<b>DISCUSSION .....</b>	<b>33</b>
6.1	Acceptability of Treatment.....	33
6.2	Reductions in Psychosocial Risk Factors .....	34
6.3	Occupational Relevance .....	36
6.4	Predictors of Improvement and Return to Work .....	37
6.5	Implementation Challenges.....	37
6.6	Limitations of the Study Findings .....	39
<b>7.</b>	<b>CONCLUSION.....</b>	<b>41</b>
	<b>BIBLIOGRAPHY .....</b>	<b>43</b>

## LIST OF TABLES

Table 1.	Sample Characteristics .....	19
Table 2.	Concurrent Treatments Received at the Time of Enrolment.....	20
Table 3.	Participant Satisfaction with Involvement in PGAP Distribution of Satisfaction Ratings .....	21
Table 4.	Clinician Fidelity to Protocol .....	23
Table 5.	Changes in Psychosocial Risk Factors .....	23
Table 6.	Changes in Symptom Severity Measures, Disability and Return-to-Work Expectancies .....	24
Table 7.	Changes in Physical and Mental Health-Related Quality of Life .....	25
Table 8.	Correlations Between Change Scores on the Psychosocial Risk Factors and Symptom Severity Measures .....	26
Table 9.	Return-to-Work Status at 3-Month Follow-up .....	26
Table 10.	Return-to-Work Status at 6-Month Follow-up .....	27
Table 11.	Regression Analysis Examining Predictors of Change in Self-Reported Disability .....	28
Table 12.	Regression Analysis Examining Predictors of Increases in Return to Work Expectancies .....	29
Table 13.	Regression Analysis Examining Predictors of Return to Work (6-months).....	30
Table 14.	Regression Analysis Examining Predictors of Improvement in the Physical Component of Quality of Life.....	31
Table 15.	Regression Analysis Examining Predictors of Improvement in the Mental Health Component of Quality of Life.....	32



## ACRONYMS AND ABBREVIATIONS

CBT:	Cognitive Behaviour Therapy
CNESST:	Commission des normes, de l'équité, de la santé et de la sécurité du travail
d:	Cohen's d
IEQ:	Injustice Experiences Questionnaire
IEQch:	Change in scores on the IEQ from pre- to post-treatment
MPQ-SF:	McGill Pain Questionnaire – Short Form
MPQ-SFch:	Change in scores on the MPQ-SF from pre- to post-treatment
PCS:	Pain Catastrophizing Scale
PCSch:	Change in scores on the PCS from pre- to post-treatment
PCL:	Post-Traumatic Stress Checklist
PCLch:	PCLch : Change in scores on the PCL from pre- to post-treatment
PDI:	Pain Disability Index.
PDIch:	Change in scores on the PDI from pre- to post-treatment
PHQ-9:	Patient Health Questionnaire – 9
PHQ-9ch:	Change in Scores on the PHQ-9 from pre- to post-treatment
PGAP:	Progressive Goal Attainment Program
PTSD:	Post-Traumatic Stress Disorder
RTW:	Return to Work
SF-36:	The Medical Outcomes Short Form – 36
TSK:	Tampa Scale of Kinesiophobia
TSKch:	Change in scores on the TSK from pre- to post-treatment
US:	United States
WRMD:	Work-related musculoskeletal disorder



## 1. INTRODUCTION

Surveys indicate that approximately 20% to 50% of individuals with musculoskeletal conditions show evidence of elevated depressive symptoms (McWilliams, Cox, & Enns, 2003). Research suggests that depressive symptoms associated with musculoskeletal disorders may increase the risk of prolonged work disability (Rezai & Cote, 2005). The evidence that has accumulated to date strongly suggests that depressive symptoms can be considered a risk factor for poor rehabilitation outcomes (Brendbekken, Vaktskjold, Harris, & Tangen, 2018; Cancelliere et al., 2016; G Waddell, Burton, & Main, 2003).

There have been increasing calls in the literature for the development of more effective approaches to managing co-morbid pain and depressive conditions (Linton et al., 2011). Current clinical practice guidelines recommend the routine screening of depressive symptoms by physical therapists and other primary health professionals (Chou et al., 2007). Despite these recommendations, there has been a dearth of research that has addressed how rehabilitation interventions should proceed once a work-disabled individual has been identified as having clinically significant levels of depressive symptoms (Gardiner et al., 2017). To date, there have been no clinical trials examining the effectiveness of interventions aimed at reducing work-disability in individuals with co-morbid pain and depression.

This study examined the effectiveness of the Progressive Goal Attainment Program (PGAP) for reducing psychosocial barriers for return to work in work-disabled individuals with musculoskeletal pain and depression.

Questions of interest included the following:

- 1- Acceptability: What proportion of individuals with debilitating symptoms of pain and depression are willing to participate in the intervention?
- 2- Satisfaction: To what degree are clients satisfied with the intervention?
- 3- Clinical Effectiveness: Does the intervention yield clinically meaningful reductions in psychosocial risk factors and indices of health and mental health status?
- 4- Occupational Relevance: Does the intervention yield clinically meaningful reductions in occupational disability?



## 2. CURRENT STATE OF KNOWLEDGE

Work-related musculoskeletal disorders (WRMD) are considered one of the leading causes of disability. In North America, WRMDs are the most expensive non-malignant health condition affecting the working-age population (Cancelliere et al., 2016). In 2017, indemnity and treatment-related costs covered by the *Commission des normes, de l'équité, de la santé et de la sécurité du travail* (CNESST) associated with WRMDs were in excess of 538 million dollars (Bastien, 2018). WRMDs accounted for 32% of all time loss arising from work injuries that occurred in 2015 in Québec alone (Bastien, 2018).

Depression has been identified as a risk factor for poor recovery outcomes following WRMDs (G Waddell et al., 2003; Wideman, Scott, Martel, & Sullivan, 2012). Individuals with pain-related musculoskeletal conditions with elevated depressive symptoms have sick leave duration that is twice as long as individuals with musculoskeletal conditions who do not have depressive symptoms (Currie & Wang, 2004; Druss, Rosenbeck, & Sledge, 2000). Depressive symptoms in individuals with musculoskeletal conditions have also been associated with longer duration of wage replacement benefits following work injury or surgical intervention (Dozois, Dobson, Wong, Hughes, & Long, 1995; Schade, Semmer, Main, Hora, & Boos, 1999). Sullivan and Stanish (2003) reported that higher levels of pre-treatment depression in individuals enrolled in a multidisciplinary rehabilitation program were predictive of poorer RTW outcomes (M. J. L. Sullivan & Stanish, 2003). Vowles and colleagues reported that 28% of the variance in RTW outcomes was accounted for by post-treatment depression scores (Vowles, Gross, & Sorrell, 2004).

Traditionally, when clients with musculoskeletal conditions have shown evidence of depressive symptoms, practice has been to refer clients to a mental health professional that will offer pharmacotherapeutic or psychotherapeutic treatment, or to offer psychological services within the context of a multidisciplinary pain program (Kerns, 2010; Rush, Polatin, & Gatchel, 2000; M. D. Sullivan & Robinson, 2006; M. J. L. Sullivan, Reesor, Mikail, & Fisher, 1992). Although symptomatic treatment is important in the management of pain and depression, research reports suggest that symptom-focused interventions do not necessarily yield reductions in disability (Millward, Lutte, & Purvis, 2005; M. J. L. Sullivan, 2003; Volin, Fargo, & Fine, 2009). The side effects of certain antidepressant medication can impede an individual's ability to participate fully in physical rehabilitation programs (e.g., nausea, drowsiness, fatigue) (Vanderkooy, Kennedy, & Bagby, 2002). Psychotherapeutic interventions can extend over significant periods of time, increasing rather than decreasing the period of disability (Streltzer, Eliashof, Kline, & Goebert, 2000). A Cochrane review of cognitive-behaviour therapy (CBT) for individuals with pain revealed that CBT was effective in reducing physical and emotional distress but had a negligible impact on return to work (Williams, Eccleston, & Morley, 2013).

### 2.1 Psychosocial Risk Factors for Delayed Recovery

A number of modifiable psychosocial variables have recently been identified as risk factors for poor rehabilitation outcomes in individuals with musculoskeletal pain and co-morbid depression. These include pain catastrophizing, fear of movement, and perceived injustice (Cancelliere et al., 2016; M. J. L. Sullivan, Adams, Martel, Scott, & Wideman, 2011). Pain catastrophizing has

been defined as an exaggerated negative 'mental set' that is brought to bear during an actual or anticipated pain experience (M. J. L. Sullivan et al., 2001). Fear of movement has been defined as an intense fear of experiencing pain associated with participation in physical activity (Vlaeyen & Linton, 2000). Perceived injustice has been defined as a cognitive appraisal where individuals evaluate the suffering and losses associated with their health or mental health condition in relation to justice violations (M. J. L. Sullivan et al., 2008).

Wideman *et al.* (2012) reported that high pre-treatment levels of pain catastrophizing were associated with the persistence of depressive symptoms in work-disabled individuals participating in a physical therapy intervention. Sullivan *et al.* (2007) reported that treatment-related reductions in pain catastrophizing and fear of movement were significant predictors of reductions in depressive symptoms in work-injured individuals with co-morbid pain and depression. Scott and Sullivan (2012) found that high pre-treatment levels of perceived injustice interfered with the resolution of depressive symptoms in individuals who were work-disabled consequent to a musculoskeletal injury.

It has been suggested that reducing psychosocial risk factors associated with pain and depressive symptoms might lead to more positive rehabilitation outcomes than interventions that focus exclusively on symptom reduction (M. J. L. Sullivan, 2003). There are several reasons for considering an approach to treatment that focuses more on disability-relevant risk factors than on symptom reduction. First, research in other areas of rehabilitation indicates clearly that symptom reduction is not a precondition to successful return to work (G. Waddell et al., 2002). Second, available research suggests that symptom-reduction interventions for persistent pain conditions yield disappointing results (Volin et al., 2009). Third, symptom-reduction techniques, whether pharmacological or psychological, tend to be passive in nature, and passive techniques have been shown to be detrimental to return-to-work outcomes (G. Waddell, 2004). Finally, excessive focus on symptom reduction inadvertently reinforces individuals' beliefs that symptoms must be eradicated before occupational activities can be resumed.

## **2.2 Targeting Pain-Related Psychosocial Risk Factors for Delayed Recovery**

Our ongoing program of research on the psychology of pain and disability has led to the development of an intervention program designed to reduce pain-related psychosocial risk factors and foster return-to-work in individuals with musculoskeletal injuries. The program, known as the Progressive Goal Attainment Program (PGAP) includes a variety of techniques aimed at reducing pain-related psychosocial risk factors including; catastrophizing, fear of movement, and perceived injustice (M. J. L. Sullivan, Adams, & Ellis, 2013).

PGAP proceeds from the perspective that the marked disability observed in individuals with debilitating health or mental health conditions is only partially determined by the severity of symptoms. Targeting psychosocial determinants of disability is seen as an approach complementary to symptom-focused interventions that can assist individuals in resuming activities that give their lives a sense of purpose and meaning. By reducing pain-related psychosocial risk factors, PGAP aims to assist individuals in resuming important activities of their day-to-day lives in spite of the fact that some of their symptoms persist.

A number of clinical cohort studies have shown that participation in PGAP is associated with significant reductions in pain-related psychosocial risk factors (M. J. L. Sullivan et al., 2013). In a sample of chronic work-disabled individuals, Sullivan and Stanish (2003) reported that participation in PGAP was associated with a 33% reduction in pain catastrophizing, and 32% reduction in pain-related fear (M. J. L. Sullivan & Stanish, 2003). Sullivan *et al.* (2006) reported that participation in PGAP was associated with a 32% reduction in pain catastrophizing and 20% reduction in pain-related fear in individuals with chronic whiplash symptoms. Sullivan *et al.* (2010) reported that individuals with chronic musculoskeletal pain who participated in PGAP showed a 43% reduction in pain catastrophizing.

The positive outcomes of PGAP, coupled with its low cost, have led to significant uptake of the intervention in Canada as well as abroad. PGAP is currently considered a preferred service by numerous workers' compensation boards and long-term disability insurers in Canada. Clinical trials of the PGAP conducted in the US and Ireland have supported the effectiveness of PGAP for the reduction of disability (Michalopoulos et al., 2011; Raftery, Murphy, O'Shea, Newell, & McGuire, 2013). The Social Security Administration of the United States conducted a trial of a telephonic version of PGAP to reduce disability in individuals with chronic debilitating health (e.g., cardiovascular disease, cancer survivors) and mental health conditions (Major Depressive Disorder, Bipolar Disorder) (Michalopoulos et al., 2011). The results of the trial showed a return to work advantage for participants who received PGAP that was maintained at 2-year follow-up (Michalopoulos et al., 2011). A modified version of PGAP was tested by the Veterans Administration of the United States and shown to yield benefit in fostering rehabilitation progress in combat veterans suffering from PTSD (Hossain, Baird, & Pardoe, 2013). In 2013, the Official Disability Guidelines for Workers' Compensation Boards in the United States listed PGAP as an evidence-based intervention for the treatment of work-disability (Denniston & Kennedy, 2013). To date, the effectiveness of the PGAP as an intervention for fostering return to work in individuals with co-morbid pain and depression has not been systematically investigated.

### **2.2.1 The Progressive Goal Attainment Program (PGAP)**

The Progressive Goal Attainment Program is a risk-targeted behavioural activation intervention aimed at fostering resumption of occupational activities following debilitating injury. The primary goals of PGAP are to reduce psychosocial barriers to rehabilitation progress, promote reintegration into life-role activities, and facilitate return-to-work. These goals are achieved through targeted treatment of psychosocial risk factors, structured activity scheduling, graded-activity involvement, activity exposure, thought monitoring, goal-setting, and motivational enhancement (M. J. L. Sullivan, Adams, Rhodenizer, & Stanish, 2006).

The two major clinically-relevant theoretical influences on the development of PGAP were Behavioural Activation Therapy (BAT) (Martell, Dimidjian, & Herman-Dunn, 2010) and Cognitive Behaviour Therapy (CBT) (Beck, Rush, Shaw, & Emery, 1978). However, BAT and CBT are intervention approaches that were developed to target the symptoms of emotional disorders, not to address psychosocial barriers to occupational engagement. In order to maximize impact on occupational outcomes, a number of additional techniques were incorporated in the intervention protocol. In PGAP, the client is made aware that return to work is the primary objective of the program. PGAP also contains a number of attitude and behaviour change techniques designed to promote more positive expectancies in relation to the resumption of occupational activities

(Rimer & Matthew, 2006). As well, shortly following the initiation of the program, the PGAP provider communicates with the insurer and employer to develop a work re-integration plan.

Although PGAP was originally developed to target psychosocial risk factors associated with pain-related disability, ongoing research revealed that the determinants of disability showed striking similarity across a wide range of debilitating health and mental health conditions (Millward et al., 2005; M. J. L. Sullivan, Thibault, Savard, & Velly, 2006). Risk factors such as pain catastrophizing, fear, and perceived injustice appear to contribute to heightened disability regardless of the nature of individuals' debilitating health or mental health condition (Adams, Thibault, Ellis, Moore, & Sullivan, 2016; Emptage, Sturm, & Robinson, 2005; Kronstrom et al., 2011; M. J. L. Sullivan, Feuerstein, Gatchel, Linton, & Pransky, 2005).

PGAP consists of 10 weekly 1-hour sessions with a trained PGAP provider. An information video is used to orient the client to the procedures of the intervention as well as to foster positive outcome expectancies. The information video explains the symptoms associated with pain conditions, how disability arises as a function of pain symptoms, and the importance of resuming important life activities in order to reduce the negative impact of pain on one's life. The content of the information video explains that return to work, as opposed to symptom reduction, is the primary objective of the intervention.

For PGAP-Depression, the introductory video was modified to make it suitable for a client population that is experiencing depressive symptoms. In the PGAP-Depression video, the narrator discusses how depressive symptoms are a frequent consequence of living with pain. The video goes on to describe how disability can arise as a result of depressive symptoms, and how resumption of important life activities will be an important element in successful rehabilitation.

Given the research showing that individuals are most persuaded by a message that is tailored to their life situation, it was necessary to modify the PGAP introductory video in a manner that would speak most directly to some of the life challenges faced by the individual with co-morbid pain and depression (Kreuter & Wray, 2003; Rimer & Matthew, 2006).

All versions of PGAP focus on the resumption of participation in activities that have been discontinued since injury. For the client with a pain condition, the types of activities that are discontinued following injury are activities that are associated with high physical demands. For the client with a depressive condition, activities that tend to be avoided are goal-directed activities and social/interpersonal activities. Both forms of avoidance will contribute to work disability, but the intervention focus will be quite different depending on whether the client has a primary pain condition, or also experiences depressive symptoms.

The PGAP-Depression intervention also places more emphasis on exposing the client to success and achievement experiences early in treatment. Motivational deficits are often a major determinant of disability associated with depression. It has been shown that success and achievement experiences can enhance motivation in goal pursuits (Forster, Grant, Idson, & Higgings, 2001; Nicholls, 1984). Thus, while the PGAP-Pain and PGAP-Depression interventions share the objectives of reducing disability and promoting successful occupational reintegration, they achieve these objectives through different intervention pathways.

A Client Workbook is provided to the client and serves as the platform for many of the intervention techniques that will be used. Through the course of the intervention, the PGAP provider works with the client to reinstate the activity structure that existed when the client was working. This typically involves asking the client to wake at the same time and to follow the same morning routine that he or she had when working. At the time that the client would have left for work, the client is asked to take a 15-minute walk. Once reinstated, the activity structure is progressively populated with goal-directed activities designed to expose the client to success and achievement experiences. Progressive goal attainment proceeds in this manner until the client reaches the level of activity engagement that is necessary to consider a transition to the workplace.



### 3. RESEARCH OBJECTIVES

This study examined the feasibility and impact of PGAP for promoting resumption of occupational activities in individuals with musculoskeletal pain and depression. The following hypotheses were tested:

H1: It was hypothesized that PGAP would yield superior return to work outcomes compared to expected base rate of return to work for injured workers with co-morbid pain and depression. Based on previous research, the expected base rate of return to work was estimated at 25%. A return to work rate of 44% or more would be considered a statistically significant improvement in outcome.

H2: It was hypothesized that participation in PGAP would yield significant decreases, of medium to large effect size, in the psychosocial risk factors targeted by the intervention (e.g., pain catastrophizing, fear of movement/re-injury, perceived injustice).

H3: It was hypothesized that participation in PGAP would yield significant decreases, of modest to medium effect size, in symptoms of depression, post-traumatic stress symptoms, pain and self-reported disability.

H4: It was hypothesized that participation in PGAP would yield significant increases, of modest to medium effect size, in quality of life.

Additional questions of interest included the following:

- 1- Acceptability: What proportion of individuals with debilitating symptoms of pain and depression are willing to participate in the intervention?
- 2- Satisfaction: To what degree are clients satisfied with the intervention?
- 3- Clinical Effectiveness: Does the intervention yield clinically meaningful reductions in psychosocial risk factors and indices of health and mental health status?
- 4- Occupational Relevance: Does the intervention yield clinically meaningful reductions in occupational disability?



## **4. METHODS**

### **4.1 Study Population**

The study sample consisted of 57 injured workers (14 women, 43 men) with musculoskeletal pain and depression.

#### **4.1.1 Selection Criteria**

Eligibility criteria included:

- 1) work-disability greater than 4 weeks and less than 18 months duration associated with a musculoskeletal injury to the back or neck,
- 2) a score above clinical threshold on a self-report measure of depression,
- 3) between 25 and 55 years of age.

### **4.2 Recruitment**

Participants were recruited through media advertisements (e.g., internet, radio, newspapers) and in 6 rehabilitation clinics in the greater Montréal region. The advertisements solicited individuals who had recently sustained a workplace injury and were currently absent from work. Potential participants were provided with a telephone number to obtain more information about the study or indicate their interest in participation. Media advertisements were run during the first week of every second month. Recruitment was paced to the availability of the rehabilitation professionals who served as PGAP providers for the study.

The research coordinator contacted prospective participants to provide further information about the study. Prospective participants were scheduled for a screening evaluation to verify that they met criteria for enrolment (measures are described in Section 4.5). If participants met eligibility criteria for enrolment, they were invited to view the PGAP Information Video, and then they were invited to enroll in the treatment program. Participants were informed that they would be reimbursed for travel costs or inconvenience costs associated with their involvement in the study. The number of patients who met inclusion criteria but declined participation after being informed about the nature of their participation was recorded as a measure of acceptability of the program.

### **4.3 The Essential Techniques of PGAP**

Participation in PGAP consisted of 10 weekly 1-hour meetings with a clinician trained in the treatment protocol. In the first half of the program, psychosocial risk factors are targeted indirectly through goal setting and activity involvement, and targeted with more risk-specific techniques in the second half of the program. The objectives of each treatment session are briefly described below.

**Session 1.** In the first meeting, the PGAP clinician's objectives include: a) developing a working alliance with the participant, b) examining the participant's pre-disability activity repertoire and c) introducing the participant to the Client Workbook. Disclosure techniques are used to develop the working alliance and as a technique to reduce catastrophic thinking.

Part of the Client Workbook resembles a daily agenda. In the first week of the program, the participant is asked to log all the activities that are completed during the course of each day of the week. The participant's activity entries during the first week of the program become the activity baseline from which the intervention proceeds. Using the participant's pre-treatment activity involvement as a baseline ensures that activity planning proceeds in a manner that does not overwhelm the participants' cognitive, emotional or physical limitations.

**Session 2.** In the second meeting, the clinician's objectives include: a) reviewing the participant's activity log, b) examining important life-role activities that have been compromised due to pain and depression, and c) introducing the participant to activity planning.

In the second week of the program, the format of the Client Workbook changes such that the participant's task now includes planning activities as opposed to simply logging activities. In addition to planning regularly occurring activities (discerned from Week 1 activity log), the participant is asked to choose one new activity that will be incorporated within the activity plan. The activity is chosen from the repertoire of life-role activities that have been discontinued since the onset of work-disability. Throughout the treatment program, emphasis is placed on planning activities that are within the participant's cognitive, emotional and physical tolerance limits. The objective of activity planning is to expose the participant to success and achievement experiences. Maximizing success and achievement experiences early in the treatment program is intended to increase motivation to continue to pursue rehabilitation goals (Meichenbaum & Turk, 1987).

**Session 3.** In the third meeting, the clinician's objectives include: a) reviewing the participant's activity log, b) assisting the participant in setting activity goals and c) assisting the participant in planning activities for the coming week.

At the beginning of each session, the clinician reviews the activity log with the participant. The clinician uses a conversational style to review important activities of the week such that the first part of every meeting can be characterized as a disclosure intervention. The emphasis on disclosure is based on research indicating that affiliated and communicative needs might be central to the pain and disability experience of high catastrophizers (M. J. L. Sullivan, Adams, & Sullivan, 2004). A goal-setting exercise is used to ensure that the participant feels 'ownership' over the direction of the program. The participant is encouraged to choose activity goals that are relevant to important life roles in order to increase their relevance to the participant's life situation. In each subsequent meeting, the participant is expected to become more and more autonomous in planning activities for the coming week.

**Session 4.** In the fourth meeting, the clinician's objectives include: a) reviewing the participant's activity log, b) engaging the participant in a discussion of treatment-related changes in activity, c) assisting the participant with activity planning for the coming week, and d) completing the mid-treatment evaluation.

A technique used in the fourth session is to invite the participant to compare activities from the first week of the program (baseline) to the activities completed in the most recent week. The participant is asked to explain the important changes that have taken place. This technique is used to challenge the participant's disability beliefs. Behaving in ways inconsistent with beliefs is considered to be one of the most effective ways of changing beliefs (Bandura, 1983).

The mid-treatment assessment is completed at the end of Session 4. The mid-treatment assessment consists of completing measures of pain severity, disability, depressive symptoms, catastrophizing, pain-related fear, and perceived injustice. These are the same measures the participants completed prior to beginning the program (described in more detail in section 4.5).

**Session 5.** In the fifth meeting, the clinician's objectives include: a) reviewing the participant's activity log, b) providing feedback about the results of the mid-treatment assessment, c) introducing the participant to tools that will be used to specifically target catastrophic thinking, pain-related fears, or perceived injustice, and d) assisting the participant in planning activities for the coming week.

Participants are provided with feedback about changes in their scores over the first four weeks of treatment. The most positive changes are presented first followed by scores that have shown more modest change. The next step in the intervention is to introduce tools that will more directly target psychosocial risk factors that have responded least to treatment (based on the mid-treatment evaluation).

**Sessions 6 to 10.** The first 4 sessions of the program are very structured and standardized across participants. The last 6 sessions vary in content and structure as a function of the nature of progress that has been made during the first 4 sessions. Different techniques are invoked depending on the profile of change revealed by the mid-treatment assessment. Although new techniques are introduced in the last 6 sessions, activity scheduling and review of activity logs remain central components of sessions throughout the intervention program.

### **Risk-Targeted Techniques**

Through the course of the intervention, PGAP providers introduce different techniques designed to target specific risk factors. Thought monitoring and re-appraisal tools are used to target catastrophic thinking. The client is guided through a series of exercises intended to highlight the negative consequences of catastrophic thinking. The PGAP provider then engages the client in a discussion of how challenging and stressful situations could be managed without engaging in catastrophic thinking. Fostering the client's participation in attention demanding activities is also used to assist the client in disengaging from catastrophic rumination.

Techniques such as guided disclosure, validation, and problem resolution strategies are used to target perceptions of injustice. Guided disclosure and validation are used to reduce the client's pressure to 'prove' the magnitude of his or her losses. Validation techniques also serve to

promote a strong working alliance between the client and the PGAP provider. Problem resolution techniques are used to encourage the client to construe injustice-eliciting situations as problem situations that can either be resolved or accepted. For each problem situation identified by the client, the PGAP provider works with the client to initiate a plan that will either resolve the problem or help the client in moving beyond the problem.

Exposure techniques are used to effect reductions in pain-related fear. Participants are asked to list activities that they are currently avoiding due to concerns that the activity will cause an exacerbation in symptoms. The activities are then rated in terms of concern severity to create a fear hierarchy. The PGAP provider works with the participant to examine how activities could be broken down into more manageable parts so as to remain within the participant's tolerance limits. The 'activity parts' are then scheduled repeatedly through the week. The intent of this technique is to use repeated exposure to discontinued activities as a strategy to reduce the degree of fear that is associated with activity participation. Fear reduction is expected to lead to reductions in pain severity, thus allowing the participant to progressively increase his/her involvement in the feared activity (Leeuw et al., 2007).

#### **4.4 The Clinicians**

The clinicians for the study included 10 rehabilitation professionals (9 occupational therapists, 1 physiotherapist). The geographical regions represented included Montréal, Saint-Jean-sur-Richelieu, Boisbriand, and Trois-Rivières. All clinicians followed a two-day training workshop to acquire the skills necessary to deliver the intervention. All clinicians received weekly supervision by a clinical psychologist (Dr. Nathalie Gauthier) with extensive experience in PGAP.

#### **4.5 Pain-Related Psychosocial Risk Measures**

The pain-related psychosocial risk measures were administered at pre-treatment screening, at mid-treatment and at the treatment termination.

##### **4.5.1 Pain Catastrophizing**

The Pain Catastrophizing Scale (PCS) was used to assess catastrophic thinking related to pain. The PCS consists of 13 items describing different thoughts and feelings that individuals might experience when they are in pain (i.e., *It's awful and I feel that it overwhelms me*). Respondents are asked to rate the frequency with which they experience the thoughts and feelings described in the item content on a 5-point scale with the endpoints (0) not at all and (4) always. Research has shown that scores on the PCS have high internal consistency (coefficient alpha = .87) and are significantly correlated with measures of pain, emotional distress and disability (M. J. L. Sullivan et al., 2001). High scores on the PCS have also been shown to be associated with prolonged work disability (Gauthier, Sullivan, Adams, Stanish, & Thibault, 2006). In the present study, the coefficient of internal consistency was .89.

### **4.5.2 Fear of Movement**

The Tampa Scale for Kinesiophobia (TSK) (Kori, Miller, & Todd, 1990) was used as a measure of fear of pain. The TSK is a 17-item questionnaire that assesses fear of (re)injury due to movement (i.e., *I'm afraid I might injure myself if I exercise*). On this scale, respondents are asked to indicate the degree to which they agree or disagree with the statement described in the item content on a 4-point scale with the end points *strongly disagree* and *strongly agree*. Scores on the TSK has been shown to be internally reliable (coefficient alpha = .77) (Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995). The TSK has been associated with various indices of behavioral avoidance and disability (Crombez, Vlaeyen, Heuts, & Lysens, 1999; Picavet, Vlaeyen, & Schouten, 2002; Wideman & Sullivan, 2011). In the present study, the coefficient of internal consistency was .83.

### **4.5.3 Perceived Injustice**

The Injustice Experiences Questionnaire (IEQ) was used to measure injury-related perceptions of injustice (M. J. L. Sullivan et al., 2008). The IEQ yields two correlated factors, labeled severity/irreparability of loss and blame/unfairness (i.e., *Nothing will ever make up for all that I have gone through*). On this scale, respondents are asked to indicate the frequency with which they experience the thoughts described in the item content on a 5-point scale with the endpoints (0) *never* to (4) *all the time*. Scores on the IEQ have been shown to have high internal consistency and test-retest reliability, and to be valid for use among individuals with musculoskeletal pain (M. J. L. Sullivan et al., 2008). In the present study, the coefficient of internal consistency was .84.

## **4.6 Outcome Measures**

Outcome measures were administered at pre-treatment, mid-treatment, and at the treatment termination. Treatment satisfaction was only assessed at the treatment termination.

### **4.6.1 Pain Severity**

The McGill Pain Questionnaire Short-Form (MPQ-SF) was used to measure pain severity (Melzack, 1987). Participants rated their current pain experience according to 11 sensory and 4 affective pain descriptors. The response scale consists of a 4-point frequency scale with the endpoints (0) "none" and (3) "severe". The measure has been shown to be reliable and valid in various clinical populations (Burckhardt & Jones, 2005; Hood, Pulvers, Carillo, Merchant, & Thomas, 2012).

### **4.6.2 Depression**

The Patient Health Questionnaire-9 (PHQ-9) was used to assess depressive symptom severity (Kroenke, Spitzer, & Williams, 2001). Participants indicated how frequently they experienced each of 9 symptoms of depression (i.e., *Feeling down, depressed or hopeless*). The response scale consists of a 4-point frequency scale with the endpoints (0) 'not at all' and (3) 'everyday'. PHQ-9 scores can range from 0 to 27 with higher scores indicating more severe depressive symptoms. The reliability and validity of scores on this measure have been established in

several different clinical samples (Gilbody, Richards, Brealey, & Hewitt, 2007; Huang, Chung, Kroenke, Delucchi, & Spitzer, 2006). In the present study, the coefficient of internal consistency was .89.

#### **4.6.3 Post-Traumatic Stress Symptoms**

The Post-Traumatic Stress Checklist (PCL) was used as a self-report measure of post-traumatic stress symptoms. The measure was included on the basis of research suggesting that PTSD symptoms were common following work injury and might contribute to delayed recovery (Giummarra et al., 2017; Warren et al., 2016). The PCL is a 17-item measure where respondents are asked to indicate the degree to which they have been bothered by different symptoms of PTSD (i.e., *Repeated disturbing memories, thoughts or images of the stressful experience*)(Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Ratings are made on a 5-point Likert scale with the end points (1) 'not at all' and (5) 'extremely'. Scores can range from 17 to 85. Research supports the reliability and validity of PCL scores to assess the severity of post-traumatic stress symptoms (Lang et al., 2012). In the present study, the coefficient of internal consistency was .92.

#### **4.6.4 Self-Reported Disability**

The Pain Disability Index (PDI) (Tait, Pollard, Margolis, Duckro, & Krause, 1987) was used to assess pain-related disability in 7 different areas of daily living (home, social, recreational, occupational, sexual, self-care, life support). For each life domain, participants provided disability ratings on 11-point scales with the endpoints (0) *no disability* and (10) *total disability*. Scores on the PDI have been shown to be internally reliable and significantly correlated with objective indices of disability (Tait, Chibnall, & Krause, 1990). In the present study, the coefficient of internal consistency was .87.

#### **4.6.5 Return to Work Expectancies**

At each assessment point, participants were asked to rate the likelihood that they would return to work within the next month using a scale with the endpoints (0%) not at all likely and (100%) extremely likely. Participants were asked to respond to the following question: *How likely is it that within the next month you will have resumed full-time employment?*

#### **4.6.6 Return to Work**

Return to work status was evaluated at 3-month and 6-month follow-up. Participants responded to a number of employment-related questions including whether they have returned to full-time work, part-time work, transitional work or whether they remain occupationally disabled.

#### **4.6.7 Quality of Life**

The Medical Outcomes Short-Form 36 (SF-36) was used to assess the quality of life. The SF-36 yields eight scale scores that represent the weighted sums of items contained within each scale. The dimensions of quality of life assessed by the SF-36 include: physical function, role limitations (physical and emotional), bodily pain, general health, vitality, social function, and

mental health. The SF-36 is one of the most commonly used measures of health-related quality of life. Scores on the different scales of the SF-36 have been shown to be internally reliable and correlated with measures of symptom severity, disability and life satisfaction. Scores on the SF-36 have been shown to be valid and reliable measures of quality of life in individuals with a wide range of health and mental health conditions (Bayley, London, Grunkemeier, & Lansky, 1995; March et al., 1999; Ritter, Albohm, Keating, Faris, & Meding, 1995; Stucki, Liang, Stucki, Bruhlmann, & Michel, 1995).

## **4.7 Process and Acceptability Measures**

### **4.7.1 Clinician Fidelity to Treatment Protocol**

The clinical supervisor rated clinician sessions according to the degree to which clinicians adhered to study protocol. Ratings were based on information gathered during weekly supervision sessions. There were three main objectives for each session. Sessions were graded as (0) *no objectives met*, (1) *objectives partially met*, (2) *objectives completely met*.

### **4.7.2 Acceptability of Treatment**

The degree of acceptability of the treatment program was assessed by computing a) the proportion of respondents who satisfied selection criteria who agreed to view the PGAP Information Video, b) the proportion of respondents who agreed to participate after watching the PGAP Information Video, and c) the proportion of patients who successfully completed the treatment program.

### **4.7.3 Treatment Satisfaction**

Satisfaction with participation in the intervention program was assessed with a single question; *How satisfied are you with the treatment you received?* Participants rated their satisfaction on a 5-point numerical scale with the verbal anchors (0) *not at all satisfied*, (1) *somewhat satisfied*, (2) *moderately satisfied*, (3) *very satisfied*, and (4) *completely satisfied*.

### **4.7.4 Clinicians Reflections on Clients' Treatment Experience**

At the termination of treatment, clinicians were asked for their impressions of clients' treatment experiences and the most notable changes that occurred through treatment. Clinician's impressions were assessed in order to explore potential areas of treatment impact that were not captured by the standardized assessment instruments.

## **4.8 Data Analytic Approach**

Means and standard deviations were computed on all study variables. Frequency distributions were examined to assess the acceptability of the intervention, and to assess clinician fidelity to protocol. T-tests for correlated samples were used to compare pre- and post-treatment scores on psychosocial risk measures and symptom severity measures. Percentage change values on measures of pain, depression, post-traumatic stress, disability and psychosocial risk are presented in order to address the clinical significance of changes from pre-to post-treatment

assessment. Pearson correlations were used to examine interrelations among indices of change. Multiple regression analyses were used to examine the relation between treatment-related changes in psychosocial risk measures and clinical outcomes. The PCL was not included in regression analyses examining recovery outcomes due to a collinearity problem with the PHQ-9.

Four participants returned to work prior to completing all 10 sessions of PGAP. For these participants, mid-treatment assessment results were carried forward and used as their post-treatment evaluation. Treatment satisfaction was only assessed at post-treatment, and as such, these 4 participants were not included in analyses of treatment satisfaction.

## 5. RESULTS

### 5.1 Sample Characteristics

Characteristics of study sample are presented in Table 1. The mean age of the sample was 41.2 years with a range of 25 to 55 years. The majority of participants were married or living common-law (82%) and had completed at least 12 years of education (90%). Means and standard deviations (SD) on the MPQ-SF, PHQ-9, PCL and PDI were similar to those that have been reported in previous research on work-disabled individuals with co-morbid pain and depression (Beneciuk et al., 2013; Warren et al., 2016). Based on scores on the MPQ-SF, the PHQ-9, and the PCL the study sample would be characterized as experiencing moderately severe symptoms pain, mild to moderate symptoms of depression, and moderately severe symptoms of PTSD at the time of admission.

**Table 1. Sample Characteristics**

<b>Variable</b>	<b>Men</b> N=43 (%) *Mean (SD)	<b>Women</b> N = 14 (%) *Mean (SD)
Age (years)	41.3 (9.4)	41.0 (8.6)
Education		
Less than high school	4 (10%)	2 (14%)
High school	20 (46%)	6 (44%)
College	11 (26%)	3 (21%)
University	8 (18%)	3 (21%)
Injury Site		
Back	10 (24%)	3 (23%)
Neck	5 (12%)	2 (14%)
Upper extremity	4 (8%)	2 (14%)
Lower extremity	6 (13%)	3 (20%)
Multiple pain sites	18 (43%)	4 (29%)
Occupation		
Labour	16 (37%)	0 (0%)
Trade	11 (25%)	0 (0%)
Health	5 (13%)	6 (43%)
Admin/clerical	5 (13%)	3 (23%)
Sales	3 (7%)	1 (6%)
Food/service	1 (2%)	2 (14%)
Education	2 (4%)	2 (14%)
Duration of work disability		
3 – 6 months	24 (55%)	5 (37%)
7 – 12 months	12 (28%)	6 (42%)
More than 12 months	7 (17%)	3 (21%)
PHQ-9 (Depression)	12.1 (6.6)*	11.3 (8.5)*
PCL (PTSD)	53.2 (14.0)*	46.3 (19.7)*
MPQ-SF (Pain)	20.7 (9.6)*	22.0 (11.8)*
Disability (PDI)	38.0 (12.1)*	36.9 (19.7)*

## 5.2 Past and Current Treatment

The majority of participants (91%) reported that they had received physiotherapy treatment at some point since their injury. Participants were also asked to report the treatments they were currently receiving. Table 2 shows the distribution of the different treatments participants were receiving at the time of enrolment in the study.

**Table 2. Concurrent Treatments Received at the Time of Enrolment**

Treatment	N	%
Pain medication	51	90%
Antidepressants	20	35%
Physiotherapy	5	9%
Occupational Therapy	15	27%
Psychotherapy	9	16%
Kinesiology	4	7%
Chiropractic	3	5%

Note: N = 57. The number of participants receiving treatment exceeds the sample size because several participants were receiving more than one treatment.

The majority of participants were receiving salary indemnity at the time of enrolment. The sources of salary indemnity were as follows; CNESST (25%), disability insurer (35%), SAAQ (10%), Veterans Affairs (10%), none (20%).

## 5.3 Acceptability of Treatment

The acceptability of the intervention to the client population was assessed using the following indices:

- a) The proportion of respondents meeting selection criteria for the study who agreed to view the PGAP Information Video,
- b) The proportion of respondents who agreed to participate in the intervention after having watched the PGAP Information Video.
- c) The proportion of participants who successfully completed the intervention.

A total of 230 injured workers responded to study advertisements. Of these, 63 met inclusion criteria for participation.

**5.3.1 Agreement to Watch the PGAP Information Video**

Participants who met selection criteria for the study were invited to watch the PGAP Information Video. A total of 63 individuals meeting selection criteria for the study responded to the study advertisements. Of these, 90% (n = 57) agreed to watch the PGAP Information Video.

**5.3.2 Agreement to Participate in the Intervention after Having Watched the PGAP Information Video**

Of the 57 individuals who agreed to watch the PGAP Information Video, 100% agreed to enroll as a participant in the study.

**5.3.3 Proportion of Participants who Successfully Completed the Intervention**

Participants who completed less than 10 sessions and did not return to work were considered to have prematurely terminated the intervention (i.e., dropped out). Proceeding from this definition, 9 participants (17%) prematurely terminated the intervention. The main reasons for premature termination included: 1) not interested (n = 3), 2) accessibility challenges (n = 2), 3) another injury or a medical procedure (n = 2), 4) no reason provided (n = 2).

**5.3.4 Treatment Satisfaction**

At the end of treatment, participants were asked to rate their satisfaction with their involvement in PGAP. The distribution of satisfaction ratings provided by participants is presented in Table 3. Overall, more than 90% of participants indicated that they were ‘very’ or ‘extremely’ satisfied with their involvement in PGAP.

**Table 3. Participant Satisfaction with Involvement in PGAP Distribution of Satisfaction Ratings**

<b>Not at all satisfied</b>	<b>Moderately satisfied</b>	<b>Very satisfied</b>	<b>Extremely satisfied</b>
0%	8.7%	17.4%	73.9%

Note: N = 44. Values represent the percentage of participants who rated their treatment satisfaction as ‘not at all’, ‘moderately’, ‘very’ or ‘extremely satisfied’.

**5.3.5 Clinicians’ Reflections on Participants’ Treatment-Related Experiences**

During the clinical supervision meetings, clinicians were asked to report on their client’s treatment engagement and treatment gains. Many of the clinicians’ reflections were consistent with the high treatment satisfaction reported by participants. Some excerpts of the supervision meetings are listed below:

***Clinician 2/Participant 11 (Session 10)***

*The client indicated that he was feeling more positive about his recovery and was more motivated to resume his employment. He noted that he was more active as a result of his participation in PGAP and felt more confident in his*

*ability to resume discontinued activities. He was beginning to increase his social activities which he felt was having a positive impact on his mood.*

***Clinician 5/Participant 16 (Session 10)***

*The client has realised that she can be more active by adapting some of her activities. She is more aware of her activity tolerance and feels more confident in her ability to achieve her activity goals. She is better able to organize her days and is looking forward to resuming her employment.*

***Clinician 6/Participant 29 (Session 10)***

*The client feels that he has made very good progress and has been able to resume most of his pre-injury activities. He feels that he is prepared to resume his employment.*

***Clinician 3/Participant 30 (Session 10)***

*The client reports having more energy, better sleep, and better mood. She feels that she has resumed many of the activities she discontinued after the onset of her depression. She indicated that her friends and family have also noticed these positive changes.*

***Clinician 3/Participant 32 (Session 10)***

*The client noted that participation in PGAP led him to feel more optimistic about the future. He felt that his participation in PGAP has led to a reduction in the severity of his depressive symptoms.*

***Clinician 9/Participant 36 (Session 10)***

*The client stated that he was very satisfied with his participation in PGAP. He described improvements in level of activity, his mood, his confidence and his motivation. He felt he was going to be able to continue to increase his involvement in his work-related activities.*

### **5.3.6 Clinician Fidelity to Treatment Protocol**

The clinical supervisor rated each supervised session according to the degree to which clinicians met session objectives. As shown in Table 4, treatment was characterized by a high degree of fidelity to protocol. For the majority of treatment sessions (71%), session objectives were completely met.

**Table 4. Clinician Fidelity to Protocol**

No objectives met	Objectives partially met	Objectives completely met
0%	29%	71%

**5.4 Clinical Effectiveness**

PGAP is intended to impact on clinical outcomes by reducing pain-related psychosocial risk factors. As such, information relevant to the clinical effectiveness of PGAP includes 1) changes in psychosocial risk factors (e.g., pain catastrophizing, fear of movement, perceived injustice), 2) changes in symptom-severity measures (e.g., pain severity, depressive symptom severity, disability), and 3) changes in quality of life.

**5.4.1 Changes in Psychosocial Risk Factors**

T-tests for paired samples were conducted to examine changes in scores on measures of pain catastrophizing (PCS), fear of movement (TSK), and perceived injustice (IEQ). Means and standard deviations for assessments conducted at pre- and post-treatment are presented in Table 5. Analyses revealed significant reductions in scores on the PCS,  $t(46) = 5.7, p < .001$ , the TSK,  $t(46) = 3.1, p < .01$ , and the IEQ,  $t(46) = 4.5, p < .001$ . Effect sizes for changes on these measures ranged from a high of .88 for pain catastrophizing (large effect size), to a low of .61 for fear of movement (medium effect size).

**Table 5. Changes in Psychosocial Risk Factors**

Variable	Pre-Treatment	Post-Treatment	% change	<i>d</i>
<b>PCS</b>	27.3 (9.8)	17.7 (11.9)	-36.0%	.88
<b>TSK</b>	45.2 (8.4)	38.8 (8.4)	-12.5%	.61
<b>IEQ</b>	30.7 (9.5)	24.0 (12.4)	-22.0%	.77

Note: N = 48. PCS = Pain Catastrophizing Scale; TSK = Tampa Scale of Kinesiophobia; IEQ = Injustice Experiences Questionnaire. *d* = Cohen’s *d* (effect size).

**5.4.2 Changes on Measures of Symptom Severity**

T-tests for paired samples were conducted to examine changes in scores on measures of pain (MPQ-SF), depression (PHQ-9), post-traumatic stress symptoms (PCL), and functional disability (PDI). Means and standard deviations for assessments conducted at pre- and post-treatment are presented in Table 6. Analyses revealed significant reductions in scores on the MPQ-SF,  $t(46) = 3.1, p = .01$ , the PHQ-9,  $t(46) = 4.2, p = .001$ , the PCL,  $t(46) = 4.2, p < .001$ , the PDI,  $t(46) = 4.8, p < .001$ , and return-to-work expectancies,  $t(46) = 5.3, p < .001$ . Effect sizes for changes on these measures ranged from a high of .95 for self-reported disability (large effect size), to a low of .48 for pain severity (medium effect size).

**Table 6. Changes in Symptom Severity Measures, Disability and Return-to-Work Expectancies**

<b>Variable</b>	<b>Pre-Treatment</b>	<b>Post-Treatment</b>	<b>% change</b>	<b><i>d</i></b>
<b>MPQ-SF</b>	19.6 (10.2)	14.6 (10.7)	-20.0%	.48
<b>PHQ-9</b>	11.6 (8.5)	7.3 (7.3)	-28.0%	.53
<b>PCL-C</b>	49.6 (17.9)	36.3 (15,9)	-23.4%	.79
<b>PDI</b>	36.0 (16.8)	21.1 (14.4)	-42.0%	.95
<b>RTW Exp</b>	32.6 (29.6)	54.2 (39.8)	+66.0%	.61

Note: N = 48. MPQ-SF = McGill Pain Questionnaire Short-Form; PHQ-9 = Patient Health Questionnaire; PCL = PTSD Checklist; PDI = Pain Disability Index; RTW Exp = Return to work expectancies; *d* = Cohen's *d* (effect size).

### **5.4.3 Changes in Quality of Life**

T-tests for paired samples were conducted to examine changes in scores on physical and mental health dimensions of quality of life (SF-36). Means and standard deviations for assessments conducted at pre- and post-treatment are presented in Table 7. Analyses revealed significant increases in quality of life on the following dimensions: physical functioning,  $t(46) = 4.7, p < .001$ ; role limitations due to physical health,  $t(46) = 3.6, p < .01$ ; role limitations due to emotional problems  $t(46) = 3.8, p = .01$ ; vitality,  $t(46) = 3.7, p < .01$ ; mental health,  $t(46) = 3.7, p < .01$ ; social functioning,  $t(46) = 4.0, p < .001$  and bodily pain,  $t(46) = 3.0, p < .01$ . Effect sizes for changes on these measures ranged from a high of .98 for physical functioning (large effect size), to a low of .27 for general health (small effect size).

**Table 7. Changes in Physical and Mental Health-Related Quality of Life**

<b>Variable</b>	<b>Pre-Treatment</b>	<b>Post-Treatment</b>	<b><i>d</i></b>
<b>Physical functioning</b>	35.2 (22.6)	57.2 (22.1)	.98
<b>Mental Health</b>	49.7 (24.9)	67.0 (22.3)	.73
<b>Vitality</b>	36.1 (18.5)	52.8 (21.0)	.84
<b>Bodily pain</b>	46.0 (13.8)	60.5 (19.6)	.66
<b>General health</b>	68.0 (16.2)	72.5 (17.7)	.27
<b>Role limitations due to physical health</b>	23.9 (36.5)	57.6 (44.2)	.83
<b>Role limitations due to emotional problems</b>	20.3 (31.4)	55.1 (41.0)	.95
<b>Social functioning</b>	52.4 (22.9)	73.2 (23.1)	.90

Note: N = 48; *d* = Cohen’s *d* (effect size).

**5.4.4 Correlations Between Change Scores on Risk and Symptom Measures**

As shown in Table 8, reductions in psychosocial risk measures (i.e., PCS, TSK, IEQ) were significantly correlated with reductions in symptom severity (i.e., MPQ-SF, PHQ9) and self-reported disability (i.e., PDI). The magnitude of the correlations indicates effect sizes in the medium to large range.

**Table 8. Correlations Between Change Scores on the Psychosocial Risk Factors and Symptom Severity Measures**

	MPQch	PHQ-9ch	PCSch	TSKch	IEQch
MPQ-SFch					
PHQ-9ch	.56**				
PCSch	.61**	.43**			
TSKch	.53**	.42**	.54**		
IEQch	.43**	.53**	.67**	.69**	
PDlch	.72**	.62**	.46**	.52**	.46**

Note: N = 48. MPQ-SFch = Change on the McGill Pain Questionnaire Short-Form from pre- to post-treatment; PHQ-9ch = Change on the Patient Health Questionnaire – 9 from pre- to post-treatment; PCSch = Change on the Pain Catastrophizing Scale from pre- to post-treatment; TSKch = Change on the Tampa Scale of Kinesiophobia from pre- to post-treatment; IEQch = Change on the Injustice Experiences Questionnaire from pre- to post-treatment; PDlch: Change on the Pain Disability Index from pre- to post-treatment; \*\* p < .01.

## 5.5 Occupational Relevance

At 3- and 6-months post-treatment, participants were contacted by telephone and interviewed about their occupational status. Table 9 shows the distribution of return-to-work status at the 3-month follow-up, while Table 10 shows the distribution of return-to-work status at the 6-month follow-up. The majority (78%) of participants who returned to full or part-time employment, returned to their pre-injury employment.

**Table 9. Return-to-Work Status at 3-Month Follow-up**

Variable	Men	Women	Total
Return to Full Time Employment	39.4%	22.2%	32.3%
Return to Part Time Employment	15.8%	33.4%	23.0%
Did not return to work	44.8%	44.4%	44.7%

**Table 10. Return-to-Work Status at 6-Month Follow-up**

Variable	Men	Women	Total
Return to Full Time Employment	53.6%	14.3%	33.0%
Return to Part Time Employment	17.8%	28.6%	25.0%
Did not return to work	28.6%	57.1%	42.9%

It was hypothesized that participation in PGAP would yield a significant increase in return-to-work rates compared to expected base-rate return to work in a sample with similar characteristics. The hypothesis was tested by comparing return-to-work outcomes following participation in PGAP to an expected base-rate probability of 25% return-to-work. For this analysis, participants were considered to have successfully returned to work if they had returned to full- or part-time employment. Proceeding from this definition, participation in PGAP was associated with a 58% return-to-work rate assessed 6 months after the end of the program. The results of a chi-square analysis revealed that the return-to-work rates observed following participation in PGAP significantly exceeded the expected base rate probability of return to work of 25%,  $\chi^2 = 12.2$ ,  $p < .001$ . The return to work advantage of PGAP remained statistically significant even when tested against a more liberal base rate probability of return to work of 40%,  $\chi^2 = 3.8$ ,  $p < .05$ .

### 5.6 Predictors of Improvement and Return to Work

A central premise underlying the development of PGAP is that return-to-work outcomes can be enhanced by treatment targeting pain-related psychosocial risk factors. The tenability of this premise can be tested by examining the role of changes in psychosocial risk factors as predictors of return to function and return to work.

Five multiple regressions were conducted to assess the value of changes in psychosocial risk factors as predictors of 1) changes in self-reported disability, 2) changes in return to work expectancies, 3) return to work, 4) changes in health-related quality of life, and 5) changes in mental health-related quality of life. In each regression, residualized change scores for psychosocial risk measures were entered in the first step of the analysis, and residualized change scores for symptom measures were entered in the second step of the analysis.

#### 5.6.1 Predicting Reductions in Self-Reported Disability

The results of a multiple regression analysis examining predictors of reductions in self-reported disability are presented in Table 11. Changes in the three psychosocial risk measures (PCSch, IEQch, TSKch) were entered in the first step of the analysis and contributed significantly to the prediction of changes in self-reported disability. Changes in symptom measures (MPQch, PHQ9ch) were entered in the second step of the analysis and also contributed significantly to the prediction of changes in self-reported disability. In the final regression equation, only changes in perceived injustice (IEQch) and pain severity (MPQch) contributed significant unique variance to the prediction of changes in self-reported disability.

**Table 11. Regression Analysis Examining Predictors of Change in Self-Reported Disability**

Variable	<i>B</i>	$R^2_{\text{change}}$	$F_{\text{change}}$	<i>P</i>
<b>Step1</b>		.22	5.2 (3,43)	.01
PCSch	.20			
IEQch	.34*			
TSKch	.07			
<b>Step 2</b>		.15	6.5 (2,41)	.01
MPQ-SFch	.45**			
PHQ-9ch	.07			

Note: N = 48. PCSch = Change on the Pain Catastrophizing Scale from pre- to post-treatment; IEQch = Change on the Injustice Experiences Questionnaire from pre- to post-treatment; TSKch = Change on the Tampa Scale of Kinesiophobia from pre- to post-treatment; MPQ-SFch = Change on the McGill Pain Questionnaire Short-Form from pre- to post-treatment; PHQ-9ch = Change on the Patient Health Questionnaire - 9 from pre- to post-treatment. \*  $p < .05$ , \*\*  $p < .01$ .

### **5.6.2 Predicting Increases in Return to Work Expectancies**

The results of a multiple regression analysis examining predictors of increases in return to work expectancies are presented in Table 12. Changes in the three psychosocial risk measures (PCSch, IEQch, TSKch) were entered in the first step of the analysis but did not contribute significantly to the prediction of changes in return to work expectancies. Changes in symptom measures (MPQch, PHQ9ch) were entered in the second step of the analysis and did not contribute significantly to the prediction of changes in return to work expectancies. In the final regression equation, only changes in pain catastrophizing (PCSch) showed a significant relation to increases in return to work expectancies.

**Table 12. Regression Analysis Examining Predictors of Increases in Return to Work Expectancies**

<b>Variable</b>	<b>B</b>	<b>R<sup>2</sup><sub>change</sub></b>	<b>F<sub>change</sub></b>	<b>P</b>
<b>Step1</b>		.07	1.4 (3,43)	.ns
<b>PCSch</b>	.36*			
<b>IEQch</b>	.16			
<b>TSKch</b>	.07			
<b>Step 2</b>	.19	.03	.95 (2,41)	.ns
<b>MPQch</b>	.17			
<b>PHQ9ch</b>	.11			

Note: N = 48. PCSch = Change on the Pain Catastrophizing Scale from pre- to post-treatment; IEQch = Change on the Injustice Experiences Questionnaire from pre- to post-treatment; TSKch = Change on the Tampa Scale of Kinesiophobia from pre- to post-treatment; MPQ-SFch = Change on the McGill Pain Questionnaire Short-Form from pre- to post-treatment; PHQ-9ch = Change on the Patient Health Questionnaire - 9 from pre- to post-treatment. \* p < .05.

### **5.6.3 Predicting Return to Work**

The results of a multiple regression analysis examining predictors of return to work are presented in Table 13. Changes in the three psychosocial risk measures (PCSch, IEQch, TSKch) were entered in the first step of the analysis and contributed significantly to the prediction of return to work. Changes in symptom measures (MPQch, PHQ9ch) were entered in the second step of the analysis but did not contribute significantly to the prediction of return to work. In the final regression equation, only changes in pain catastrophizing (PCSch) and changes in perceived injustice (IEQch) contributed significant unique variance to the prediction of return to work.

**Table 13. Regression Analysis Examining Predictors of Return to Work (6-months)**

Variable	<i>B</i>	$R^2_{\text{change}}$	$F_{\text{change}}$	P
<b>Step1</b>		.19	4.5 (3,43)	.01
<b>PCSch</b>	.51**			
<b>IEQch</b>	.31*			
<b>TSKch</b>	.26			
<b>Step 2</b>		.02	.70 (2,41)	.ns
<b>MPQch</b>	.03			
<b>PHQ9ch</b>	.16			

Note: N = 48. PCSch = Change on the Pain Catastrophizing Scale from pre- to post-treatment; IEQch = Change on the Injustice Experiences Questionnaire from pre- to post-treatment; TSKch = Change on the Tampa Scale of Kinesiophobia from pre- to post-treatment; MPQ-SFch = Change on the McGill Pain Questionnaire Short-Form from pre- to post-treatment; PHQ-9ch = Change on the Patient Health Questionnaire - 9 from pre- to post-treatment. \*  $p < .05$ , \*\*  $p < .01$ .

#### **5.6.4 Predicting Improvement in Quality of Life (SF Physical Function)**

The results of a multiple regression analysis examining predictors of improvement in the physical component of quality of life are presented in Table 14. Changes in the three psychosocial risk measures (PCSch, IEQch, TSKch) were entered in the first step of the analysis and contributed significantly to the prediction of improvement in the physical component of quality of life. Changes in symptom measures (MPQch, PHQ9ch) were entered in the second step of the analysis and made a marginally significant contribution to the prediction of improvement in the physical component of quality of life. In the final regression equation, only changes in perceived injustice (IEQch) and pain severity (MPQch) contributed significant unique variance to the prediction of changes in the physical component of quality of life.

**Table 14. Regression Analysis Examining Predictors of Improvement in the Physical Component of Quality of Life**

<b>Variable</b>	<b>B</b>	<b>R<sup>2</sup><sub>change</sub></b>	<b>F<sub>change</sub></b>	<b>P</b>
<b>Step1</b>		.22	5.3 (3,43)	.01
<b>PCSch</b>	-.01			
<b>IEQch</b>	-.29*			
<b>TSKch</b>	-.03			
<b>Step 2</b>		.07	2.9 (2,41)	.06
<b>MPQch</b>	-.31*			
<b>PHQ9ch</b>	-.06			

Note: N = 48. PCSch = Change on the Pain Catastrophizing Scale from pre- to post-treatment; IEQch = Change on the Injustice Experiences Questionnaire from pre- to post-treatment; TSKch = Change on the Tampa Scale of Kinesiophobia from pre- to post-treatment; MPQ-SFch = Change on the McGill Pain Questionnaire Short-Form from pre- to post-treatment; PHQ-9ch = Change on the Patient Health Questionnaire - 9 from pre- to post-treatment; \* p < .05.

**5.6.5 Predicting Improvement in Quality of Life (SF Mental Health)**

The results of a multiple regression analysis examining predictors of changes in the mental health component of quality of life are presented in Table 15. Changes in the three psychosocial risk measures (PCSch, IEQch, TSKch) were entered in the first step of the analysis and contributed significantly to the prediction of changes in the mental health component of quality of life. Changes in symptom measures (MPQch, PHQ9ch) were entered in the second step of the analysis and also contributed significantly to the prediction of changes in the mental health component of quality of life. In the final regression equation, only changes in perceived injustice (IEQch) and changes in depressive symptom severity (PhQ9) contributed significant unique variance to the prediction of changes in the mental health component of quality of life.

**Table 15. Regression Analysis Examining Predictors of Improvement in the Mental Health Component of Quality of Life**

<b>Variable</b>	<b>B</b>	<b>R<sup>2</sup><sub>change</sub></b>	<b>F<sub>change</sub></b>	<b>P</b>
<b>Step1</b>		.29	7.9 (3,43)	.01
<b>PCSch</b>	-.15			
<b>IEQch</b>	-.37**			
<b>TSKch</b>	-.01			
<b>Step 2</b>		.13	6.3 (2,41)	.01
<b>MPQch</b>	-.04			
<b>PHQ9ch</b>	-.39**			

Note: N = 44. PCSch = Change on the Pain Catastrophizing Scale from pre- to post-treatment; IEQch = Change on the Injustice Experiences Questionnaire from pre- to post-treatment; TSKch = Change on the Tampa Scale of Kinesiophobia from pre- to post-treatment; MPQ-SFch = Change on the McGill Pain Questionnaire Short-Form from pre- to post-treatment; PHQ-9ch = Change on the Patient Health Questionnaire - 9 from pre- to post-treatment; \*\* p < .01.

## 6. DISCUSSION

Numerous investigations have shown that the presence of depressive symptoms adversely affects recovery from musculoskeletal injury (Cancelliere et al., 2016). Psychosocial risk factors such as pain catastrophizing, fear of movement and perceived injustice have been shown to be related to the severity of symptoms of pain, as well as the severity of symptoms of depression (M. J. L. Sullivan, Adams, Stanish, & Savard, 2005). Findings from several lines of research converge to suggest that interventions targeting psychosocial risk factors might enhance the recovery potential of work-disabled individuals with co-morbid pain and depression.

### 6.1 Acceptability of Treatment

An important finding of this study was the high rate of acceptability of the intervention of individuals with co-morbid pain and depression. The ultimate impact of any intervention program is determined in part by the degree to which individuals are agreeable to participate in it. In the present study, of 63 individuals who were invited to participate in the intervention, 57 participants (90%) agreed to view the PGAP Information Video. All individuals (100%) who viewed the PGAP Information Video agreed to enroll in the intervention program. Only 9 participants (17%) discontinued the intervention program prematurely.

In a previous study of individuals with whiplash injuries, over 80% of individuals who were invited to participate in PGAP, agreed to take part in the intervention (M. J. L. Sullivan, Adams, et al., 2006). There are a number of factors that might account for the high rate of acceptability of the PGAP intervention. In PGAP, an introductory video is used to engage the participant in the intervention. The video provides a detailed description of the objectives of PGAP, and summarizes the main elements of the intervention. In this manner, the potential participant is aware of all procedural aspects of the intervention before he or she agrees to enroll. In the video, PGAP is presented as a program designed to prevent the development of permanent disability that can arise consequently to work injury. Within the first two weeks of the program, several techniques are used to develop a strong working alliance with the client. Once established, the working alliance is intended to act as a motivational enhancement factor contributing to the client's continued engagement in the intervention program.

An additional factor that likely contributed to the high acceptability of PGAP is the client-centered orientation of the program. All activity planning in PGAP is guided by activity goals that have been chosen by the client. This approach is used to maximize the probability that increasing activity participation will be experienced as meaningful and purposeful by the client. As well, by focusing on goal-relevant and role-relevant activities, the participant is likely to experience his or her involvement in the intervention as contributing to an increase in quality of life. Indeed, participation in PGAP was associated with large effect sizes for improvements in 7 of 8 dimensions of quality of life assessed by the SF-36.

## 6.2 Reductions in Psychosocial Risk Factors

As predicted, participation in PGAP was associated with significant reductions on several measures of pain-related psychosocial risk factors. Medium to large effect sizes were observed for reductions in psychosocial risk measures. In the present study, the most pronounced change was for pain catastrophizing, where participation in PGAP was associated with a 36% reduction in scores. Perceptions of injustice decreased by 22% and fear of movement decreased by 12%. The variation in magnitude in changes in different psychosocial risk measures might be attributable, at least in part, to the nature of the risk-targeted techniques used. Techniques such as guided disclosure, validation, thought monitoring and emotional problem solving are used to target catastrophic thinking and perceived injustice. These are techniques that are used during the PGAP treatment sessions. Fear of movement is targeted through repeated exposure to discontinued activities. This takes the form of scheduling discontinued activities repeatedly though the week. Although the PGAP provider assists the participant in planning repeated exposure to discontinued activities, the participant is expected to follow through on planned activities in the days between PGAP sessions. It is possible that participants with high levels of fear of movement might not follow through on all planned activities, thus adversely affecting the potential fear-reducing effects of activity exposure.

Reductions in psychosocial risk factors were significantly correlated with reductions in pain severity, depression, and disability. Reductions in psychosocial risk factors were also associated with increases in return-to-work expectancies. Although PGAP is not intended as a symptom-reduction intervention, participation in PGAP was nevertheless associated with clinically meaningful reductions in symptoms of depression. Pain symptoms showed only modest reduction through the course of treatment.

Several of the techniques used in PGAP, such as re-integration in discontinued activities, and thought monitoring and problem solving, are similar to techniques that are used in cognitive-behavioural interventions for depression. However, in PGAP, these techniques are not used to reduce symptom severity, they are used to reduce disability. The results reflect this difference in focus. PGAP effects on reducing disability and increasing return-to-work expectancies were of larger magnitude (respectively 42% and 66%) than PGAP effects on symptom-reduction (20% to 28%).

Reviews of literature suggest that CBT, offered as a stand-alone intervention or in combination with physical therapy does not contribute to enhanced return to work outcomes (Morley, Eccleston, & Williams, 1999; Schaafsma, Schonstein, Ojajarvi, & Verbeek, 2011; Shearer et al., 2015). It is worthwhile to reflect on why PGAP might contribute to better return to work outcomes when CBT does not. It is important to consider that CBT (as applied to pain conditions) does not refer to a specific program of treatment. Rather CBT can best be construed as a collection of psychological or behavioural techniques that have as a primary objective fostering adaptive cognitive and/or behavioural responses to pain. Cognitive-behavioural techniques vary widely in their characteristics and their intended impact. Some techniques are aimed at reducing the severity of physical or emotional symptoms, others are aimed at promoting re-engagement in important life activities, still others are aimed at fostering more effective self-management (M. J. L. Sullivan, Feuerstein, et al., 2005). Some techniques might

be combined into a structured program of treatment while others might be delivered as brief stand-alone interventions.

The effectiveness of any psychological intervention aiming to promote return to work will depend, at least in part, on the degree to which the intervention engages central stakeholders in occupational disability, namely the insurer and the employer (M. J. L. Sullivan & Main, 2007). In the past, the provision of psychological treatment has proceeded under a shroud of secrecy intended to protect the client's confidentiality. A negative consequence of such cloistered approaches to treatment was the inability to work in concert with stakeholders to ensure that all necessary steps (e.g., income protection, modified duties, accommodation) were being taken to maximize the success of occupational re-integration efforts. As well, traditional psychological approaches have tended to be primarily symptom-focused, either aimed at reducing pain severity or the severity of symptoms of an accompanying mental health condition (M. J. L. Sullivan & Mankovsky, 2014). Since symptom severity has been shown to account for only modest variance in occupational disability, symptom-focused interventions can also be expected to generate only modest benefit.

With its focus on disability reduction, PGAP is not considered to be a mental health intervention, even when used with clients who present with a mental health problem. As a result, a mental health professional is not required to deliver the intervention. In the present study, 9 of 10 PGAP clinicians were occupational therapists. In the clinical practice community, PGAP trained providers represent a wide range of rehabilitation disciplines including occupational therapy, physiotherapy, kinesiology, rehabilitation counselling, and nursing.

An advantage of PGAP is that it can be offered as a complementary treatment even when clients are being followed by a mental health professional. If PGAP was restricted to mental health professionals, it could not be offered if a client was also being treated in psychotherapy. However, since PGAP providers are not mental health professionals, there would rarely be occasion when PGAP could not be offered in combination with psychotherapy. The orientation of PGAP would be considered conceptually compatible with several psychotherapeutic orientations such as CBT, BAT, and acceptance and commitment therapy (ACT). PGAP would be less conceptually compatible with psychotherapeutic orientations that have a more passive or palliative character.

In PGAP training workshops, clinicians are strongly encouraged to communicate with mental health professionals involved in the treatment of the client. Although PGAP is not aimed at targeting the symptoms of the client's mental health condition, there are several techniques used in PGAP that are similar to those used in mental health interventions such as CBT, BAT or ACT. A discussion between the PGAP provider and the mental health professional is important to ensure that there is conceptual consistency in the information that is being communicated to the client, and that the treatment approaches are experienced by the client complementary as opposed to redundant.

### 6.3 Occupational Relevance

Participation in PGAP was associated with a 42% reduction in self-reported disability. At the beginning of treatment, the mean PDI score was 36, corresponding to the 50<sup>th</sup> percentile of PDI scores in samples of work-disabled individuals with musculoskeletal pain (Chibnall & Tait, 1994; M. J. L. Sullivan & Stanish, 2003). At the end of treatment, the mean score of the PDI decreased to 21, corresponding to the 16<sup>th</sup> percentile of PDI scores in samples of work-disabled individuals with musculoskeletal pain.

Return to work expectancies also increased as a function of participation in PGAP. At the beginning of treatment, participants rated the probability that they would return to full time work as 32% (low). At the end of treatment, participants rated the probability that they would return to full time work as 54% (moderate), representing an increase of 66% from baseline ratings. Numerous investigations have shown that recovery expectancies are prognostic indicators for return to work following musculoskeletal injury (J. S. Carriere, Thibault, & Sullivan, 2015; Gross & Battié, 2005; Schultz et al., 2002). Du Bois et al. reported that work-disabled individuals who were less than 100% certain that they would return to work within the next 6 months were 4 times less likely to return to work during that time period (Du Bois & Donceel, 2008). A study by Turner et al. showed that injured workers who reported 'low certainty' of return to work within the next 6 months had over 12 times the amount of disability days than those who were 'extremely certain' of returning to work (Turner et al., 2006). Although there have been considerable cross-study variations in the manner by which expectancies have been assessed, findings have been consistent in showing that more negative, or less positive, recovery expectancies have been associated with poorer return to work outcomes (Kuijer, Groothoff, Brouwer, Geertzen, & Dijkstra, 2006; Mondloch, Cole, & Frank, 2001). Recently, there have been calls for greater attention to the effects of rehabilitation interventions in return to work expectancies (Cancelliere et al., 2016).

Participation in PGAP was associated with a 58% return to work rate assessed at 6-month follow-up. Assuming that the base rate (or expected) probability of return to work was approximately 25%, the return to work rate achieved through PGAP would be considered clinically meaningful. The assumption of 25% base rate is justified given what is known about the relation between chronicity and return to work. The mean duration of work disability in the study sample was approximately 6 months. Epidemiological studies suggest that, of the population of work-injured individuals who remain work-disabled at 6-month post-injury, fewer than 25% are expected to resume their employment (Frank et al., 1998; Linton et al., 2005; Spitzer, LeBlanc, & Dupuis, 1987; G. Waddell et al., 2002). The base rate of return to work for individuals with co-morbid pain and depression would be expected to be even lower (Lotters & Burdorf, 2006).

## 6.4 Predictors of Improvement and Return to Work

The conceptual framework from which PGAP was developed proposes that reductions in disability can be achieved through reduction of psychosocial risk factors. The tenability of this position was addressed by examining whether changes in psychosocial risk factors were associated with reductions on indices of disability.

The findings of the present study suggest that reductions in psychosocial risk factors contribute to more positive rehabilitation outcomes. Multivariate analyses revealed that reductions in pain catastrophizing were associated with increases in return to work expectancies, and return to work. Multivariate analyses revealed that reduction in perceived injustice was associated with reductions in self-reported disability, return to work, and improvements in the physical and mental health components of quality of life. Although reduction in fear of movement was correlated with reduction in self-reported disability in univariate, fear of movement did not emerge as a unique predictor of reduced self-reported disability in multivariate analyses. In other words, the contribution of reduction in fear of movement to the prediction of reduction in self-reported disability was not independent of the contributions of pain severity and perceived injustice.

Findings are consistent with previous research showing that reduction in catastrophizing is a robust psychosocial predictor of return to work (M. J. L. Sullivan & Adams, 2010; M. J. L. Sullivan, Adams, et al., 2006; M. J. L. Sullivan, Feuerstein, et al., 2005). The findings are also consistent with previous research showing that reductions in perceived injustice are associated with reductions in self-reported disability (Yakobov et al., 2018). The weaker relation between change in fear of movement and indices of disability is likely due to the failure of treatment to yield a clinically meaningful change in fear of movement. Fear of movement was reduced by only 12.5%. On psychosocial risk measures, changes of at least 20% are considered necessary to impact in a meaningful way on clinical outcomes (Scott, Wideman, & Sullivan, 2014).

Symptom severity also emerged as a significant predictor of reductions on indices of disability. Reduction in pain severity was associated with reductions in self-reported disability and improvement in the physical component of quality of life. Reduction in depressive symptom severity was associated with improvements in the mental health component of quality of life. Neither reduction in pain severity nor depressive symptom severity was associated with return to work. The latter findings are consistent with previous research showing that reduction in symptom severity is not a primary determinant of return to work following rehabilitation of musculoskeletal injury (J.S. Carriere, Thibault, Milioto, & Sullivan, 2015; J. S. Carriere et al., 2015; M. J. L. Sullivan, Feuerstein, et al., 2005; Wideman & Sullivan, 2011).

## 6.5 Implementation Challenges

The results of the present study suggest that risk-targeted behavioural activation interventions should be considered as a treatment option in the rehabilitation of work-injured individuals with co-morbid pain and depression. However, efforts to make this type of intervention available to all clients in need will be associated with a number of challenges. First, the skill set required to deliver a standardized risk-targeted behavioural activation intervention, such as PGAP, is not

part of the repertoire of skills that rehabilitation professionals possess upon graduation. At this time, the skill set must be acquired as part of post-graduate continuing education.

In order to act as clinicians for the current trial, rehabilitation professionals followed a two-day training workshop to become fluent in the philosophy and techniques of PGAP. In addition, clinicians for the current trial received weekly supervision. The weekly clinical supervision was intended to facilitate the acquisition and effective use of PGAP techniques, and to assist the clinician in navigating difficult clinical situations that might arise. Clinical supervision was also intended to foster fidelity to protocol. Following the acquisition of new clinical tools, clinicians show a tendency to drift back to their pre-training approach to treatment. This 'protocol drift' ultimately impacts negatively on the outcome of treatment, as the treatment being offered resembles less and less the standardized protocol in which they were trained. Supervisory oversight is critical to preventing protocol drift.

Training in standardized approaches to treatment, coupled with clinical supervision are typical characteristics of treatment offered within the context of a clinical research trial. These, however, are not characteristics of treatment that would be typically offered in clinical practice. Differences in the rigour of the application of clinical techniques likely accounts for perceptions that interventions used in clinical practice do not yield the same degree of success as similar interventions described in the results of clinical trials.

Although co-morbid pain and depression is considered a very costly health and disability problem, when viewed from a population perspective, work-disabled individuals with co-morbid pain and depression are distributed over a wide geographical area. If PGAP was to be considered as a treatment option to managing disability associated with co-morbid pain and depression, it would be necessary to develop a plan to disseminate the required skill set to rehabilitation professionals on a region-wide basis. There would be both logistic and financial barriers that would need to be overcome. Mobilizing the resources necessary to train a large and geographically representative group of rehabilitation professionals in the skill set necessary to deliver PGAP would not be trivial. Furthermore, private sector rehabilitation professionals might not be enthusiastic about relinquishing two-days of revenue to attend a clinical training workshop that might yield only modest increases in referrals.

Financial challenges also arise when considering that PGAP is an intervention delivered by a single rehabilitation provider. This model of service delivery is not associated with an attractive profit margin for the private sector rehabilitation professional, and might be a disincentive to service provision particularly in large clinics with high overhead costs.

One possible solution to these implementation challenges might be the establishment of a tele-health service delivery unit specializing in the delivery of PGAP. A tele-health service delivery unit would have the advantage of wide geographical reach, while requiring a minimal number of trained professionals. The low overhead costs of tele-health service delivery would also keep treatment costs at a minimum. One study has compared face-to-face and tele-health delivery models of PGAP (M. J. L. Sullivan & Simon, 2012). The results of the study showed that both approaches were equally effective in reducing psychosocial risk factors, although the face-to-face delivery approach showed superior return to work outcomes.

Our team is currently developing a web-based platform to increase the geographical reach of PGAP. The client workbook is being replaced by a web-based activity planning module. The educational content of the client workbook has been replaced by animated videos designed to communicate best-practice information aimed at fostering successful occupational re-integration. The intervention remains interactive with weekly sessions where the PGAP provider and client communicate by telephone or through the audio feature of their electronic device. In the coming year, our team will be conducting preliminary work to examine the acceptability and impact of these changes in service delivery format.

Tele-health service delivery models have been used successfully in mental health. Numerous investigations have shown that it is possible to engage clients sufficiently to yield meaningful clinical improvement (Mohr, Vella, Hart, Heckman, & Simon, 2008; Tutty, Ludman, & Simon, 2005). Relevant to the present program of research is that the most positive outcomes have been reported for tele-health interventions for depression (Mohr et al., 2005). Tele-health interventions have also been shown to yield positive results for pain-related problems, but to date, none have reported meaningful effects on disability or return to work outcomes (Dario et al., 2017; Herbert et al., 2017).

It might be possible to augment the return to work outcomes of tele-health interventions by accessing local vocational services to coordinate a return to work plan. An important future study would be to conduct a clinical trial of the effectiveness of the tele-health delivery of PGAP combined with vocational services as an approach to fostering occupational reintegration in work-disabled individuals with co-morbid pain and depression.

In the long term, efforts to influence the clinical curriculum of rehabilitation training programs might represent a viable approach to skill-set dissemination. The last two decades have witnessed a greater openness to move beyond the traditional silos of discipline-specific approaches to treatment, and incorporate evidence-based tools from a wider range of sources. Psychosocial tools are being incorporated increasingly in the training of rehabilitation service providers such as physiotherapists, occupational therapists, kinesiologists and nurses. It is not beyond the realm of possibilities to consider that these disciplines might also be more open to acquiring the skills necessary to deliver a standardized psychosocial intervention to foster return to work in individuals with co-morbid medical and mental health problems. Web-based training technology might offer a cost-effective approach to wide dissemination of evidence-based skill sets such as those used in PGAP.

## **6.6 Limitations of the Study Findings**

Caution must be exercised in the interpretation of the study findings. First, the study did not contain a control group. In the absence of a control group, it is not possible to unambiguously attribute observed clinical improvement to the effects of participating in PGAP. The majority of participants in the trial were also receiving other health and mental health services. It is not possible to rule out the possibility that observed treatment gains were the result of participation in other concurrent treatments.

It is also important to note that the study sample differs in important ways from the population of claimants of injury or disability insurers. Individuals who volunteer to participate in a clinical trial

aimed at fostering return to work likely present with a higher degree of motivation and engagement than the average claimant of a disability insurer. The limitation is not unique to the present study but affects the interpretation and generalizability of all clinical trials using volunteers as participants.

Sample characteristics must also be considered in the generalizability of the findings. The sample was predominantly male with the duration of work disability of approximately 6 months, living in the greater Montreal region. These characteristics necessarily have implications for the generalizability of findings.

Process analyses examining the relation between changes in psychosocial risk factors and clinical outcomes were correlational in nature. As such, conclusions about the direction of influence among variables must proceed with caution. While it is possible that reductions in psychosocial factors contributed to reductions in disability, it is also possible that reductions in disability led to reductions in psychosocial risk factors.

Regression results revealed that changes in psychosocial and symptom measures accounted for 10% to 37% of the variance in occupationally-relevant outcomes. These findings indicate that the bulk of variance in occupationally-relevant outcomes was not captured (or targeted) by the variables assessed in this study. It is important to recognize that there are many other variables that might have been included as targets of treatment (e.g., helplessness, locus of control, acceptance). However, it was not feasible within the limits of a brief, standardized intervention to target an exhaustive list of all possible psychological influences on pain and disability. Similarly, there are several workplace variables (e.g., physical demands, employer-employee relations, availability of workplace modifications) known to be associated with occupational re-integration that were not assessed or targeted in the present study. Expanding the range of variables assessed or targeted by a treatment approach might yield more powerful predictive models.

## 7. CONCLUSION

The present study sought to examine the feasibility and impact of PGAP on clinical improvement and return-to-work in work-disabled individuals with co-morbid pain and depression. The results of the study revealed that the intervention had a high level of acceptability where the majority of participants who met inclusion criteria agreed to participate, and the majority of participants who were enrolled in the study, successfully completed the intervention. The results revealed that clinical symptoms (e.g., pain, depression, post-traumatic stress) and pain-related psychosocial risk factors decreased significantly through the course of treatment. Follow-up telephone interview at 6-month post-treatment revealed that 58% of participants in the study had returned to work. Reductions in psychosocial risk factors were associated with reductions in disability and improvement in quality of life.

The findings of the present study highlight the importance of targeting psychosocial risk factors to promote recovery and occupational reintegration in work-disabled individuals with co-morbid pain and depression. Over the past two decades, important strides have been made in the development of instruments to identify individuals at risk for problematic outcomes. What has lagged has been the development and implementation of interventions specifically designed to target psychosocial risk factors for delayed recovery. Particularly in the early period of recovery following musculoskeletal injury, treatment focus remains primarily symptom-focused. Complementing symptom-focused interventions with interventions targeting psychosocial determinants for prolonged disability might contribute to more positive recovery outcomes and lower claim costs in work-disabled individuals with co-morbid pain and depression.



## BIBLIOGRAPHY

- Adams, H., Thibault, P., Ellis, T., Moore, E., & Sullivan, M. J. L. (2016). The relation between catastrophizing and occupational disability in individuals with major depression: Concurrent and prospective associations. *Journal of Occupational Rehabilitation*, 27, 405 - 412. doi:10.1007/s10926-016-9669-7
- Bandura, A. (1983). Reflections on self-efficacy. *Advances in Behavior Research and Therapy*, 1, 237 - 269.
- Bastien, N. (2018). *Valeurs calculées par le Groupe de Connaissance et Surveillance Statistiques (GCSS) de la Direction scientifique de l'IRSST. Demande #2018-027*. . Montreal, Quebec.: Sources des données : CNESST - DDCR (2015-2017).
- Bayley, K. B., London, M. R., Grunkemeier, G. L., & Lansky, D. J. (1995). Measuring the success of treatment in patient terms. *Medical Care*, 33(4 Suppl), AS226-235.
- Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1978). *Cognitive Therapy for Depression*. New York.: Guilford.
- Beneciuk, J. M., Bishop, M. D., Fritz, J. M., Robinson, M. E., Asal, N. R., Nisenzon, A. N., & George, S. Z. (2013). The STarT back screening tool and individual psychological measures: evaluation of prognostic capabilities for low back pain clinical outcomes in outpatient physical therapy settings. *Physical Therapy*, 93(3), 321-333. doi:10.2522/ptj.20120207
- Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist (PCL). *Behaviour Research and Therapy*, 34(8), 669-673.
- Brendbekken, R., Vaktskjold, A., Harris, A., & Tangen, T. (2018). Predictors of return-to-work in patients with chronic musculoskeletal pain: A randomized clinical trial. *Journal of Rehabilitation Medicine* :, 50(2), 193-199. doi:10.2340/16501977-2296
- Burckhardt, C. S., & Jones, K. D. (2005). Effects of chronic widespread pain on the health status and quality of life of women after breast cancer surgery. *Health and Quality of Life Outcomes*, 3(1), 30 - 35.
- Cancelliere, C., Donovan, J., Stochkendahl, M. J., Biscardi, M., Ammendolia, C., Myburgh, C., & Cassidy, J. D. (2016). Factors affecting return to work after injury or illness: best evidence synthesis of systematic reviews. *Chiropractic Manual Therapy*, 24(1), 32. doi:10.1186/s12998-016-0113-z
- Carriere, J. S., Thibault, P., Milioto, M., & Sullivan, M. J. L. (2015). Expectancies mediate the relations among pain catastrophizing, fear of movement, and return to work after whiplash injury. *Journal of Pain*, 16, 1280 - 1287.
- Carriere, J. S., Thibault, P., & Sullivan, M. J. L. (2015). The mediating role of recovery expectancies on the relation between depression and return-to-work. *Journal of Occupational Rehabilitation*, 25(2), 348-356. doi:10.1007/s10926-014-9543-4
- Chibnall, J. T., & Tait, R. C. (1994). The Pain Disability Index: factor structure and normative data. *Archives of Physical Medicine and Rehabilitation*, 75(10), 1082-1086.
- Chou, R., Qaseem, A., Snow, V., Casey, D., Cross, J. T., Shekelle, P., . . . Panel, A. P. S. L. B. P. G. (2007). Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Annals of Internal Medicine*, 147(7), 478-491.

- Crombez, G., Vlaeyen, J. W., Heuts, P. H., & Lysens, R. (1999). Pain-related fear is more disabling than pain itself: evidence on the role of pain-related fear in chronic back pain disability. *Pain, 80*(1-2), 329-339.
- Currie, S., & Wang, J. (2004). Chronic back pain and major depression in the general Canadian population. *Pain, 107*, 54-60.
- Dario, A. B., Moreti Cabral, A., Almeida, L., Ferreira, M. L., Refshauge, K., Simic, M., . . . Ferreira, P. H. (2017). Effectiveness of telehealth-based interventions in the management of non-specific low back pain: a systematic review with meta-analysis. *The Spine Journal, 17*(9), 1342-1351. doi:10.1016/j.spinee.2017.04.008
- Denniston, P. L., & Kennedy, C. W. (2013). *Official Disability Guidelines* (18th Edition. ed.). Encinitas, CA: Work Loss Data Institute.
- Dozois, D., Dobson, K., Wong, M., Hughes, D., & Long, A. (1995). Factors associated with rehabilitation outcomes in patients with low back pain (LBP): Prediction of employment outcome at 9-month follow-up. *Rehabilitation Psychology, 40*, 243-259.
- Druss, B., Rosenbeck, R., & Sledge, W. (2000). Health and disability costs of depressive illness in a major US corporation. *American Journal of Psychiatry, 157*, 1274-1278.
- Du Bois, M., & Donceel, P. (2008). A screening questionnaire to predict no return to work within 3 months for low back pain claimants. *European Spine Journal, 17*(3), 380-385. doi:10.1007/s00586-007-0567-8
- Emptage, N. P., Sturm, R., & Robinson, R. L. (2005). Depression and comorbid pain as predictors of disability, employment, insurance status, and health care costs. *Psychiatric Services, 56*(4), 468-474. doi:10.1176/appi.ps.56.4.468
- Forster, J., Grant, H., Idson, C., & Higgings, E. T. (2001). Success/failure feedback, expectancies, and approach/avoidance motivation: How regulatory focus moderates classic relations. *Journal of Experimental Social Psychology, 37*, 253 - 260.
- Frank, J., Sinclair, S., Hogg-Johnson, S., Shannon, H., Bombardier, C., Beaton, D., & Cole, D. (1998). Preventing disability from work-related low back pain - New evidence gives new hope. *Canadian Medical Association Journal, 158*, 1625-1631.
- Gardiner, P., Lestoquoy, A. S., Gergen-Barnett, K., Penti, B., White, L. F., Saper, R., . . . Liebschutz, J. M. (2017). Design of the integrative medical group visits randomized control trial for underserved patients with chronic pain and depression. *Contemporary Clinical Trials, 54*, 25-35. doi:10.1016/j.cct.2016.12.013
- Gauthier, N., Sullivan, M. J., Adams, H., Stanish, W. D., & Thibault, P. (2006). Investigating risk factors for chronicity: the importance of distinguishing between return-to-work status and self-report measures of disability. *JOEM, 48*(3), 312-318. doi:10.1097/01.jom.0000184870.81120.49
- Gilbody, S., Richards, D., Brealey, S., & Hewitt, C. (2007). Screening for depression in medical settings with the Patient Health Questionnaire (PHQ): A diagnostic meta-analysis. *Journal of General Internal Medicine, 22*(11), 1596-1602.
- Giummarra, M. J., Cameron, P. A., Ponsford, J., Ioannou, L., Gibson, S. J., Jennings, P. A., & Georgiou-Karistianis, N. (2017). Return to Work After Traumatic Injury: Increased Work-Related Disability in Injured Persons Receiving Financial Compensation is Mediated by Perceived Injustice. *Journal of Occupational Rehabilitation, 27*(2), 173-185. doi:10.1007/s10926-016-9642-5
- Gross, D. P., & Battié, M. C. (2005). Work-Related Recovery Expectations and the Prognosis of Chronic Low Back Pain Within a Workers' Compensation Setting. *JOEM, 47*(4), 428-433.

- Herbert, M. S., Afari, N., Liu, L., Heppner, P., Rutledge, T., Williams, K., . . . Wetherell, J. L. (2017). Telehealth Versus In-Person Acceptance and Commitment Therapy for Chronic Pain: A Randomized Noninferiority Trial. *Journal of Pain, 18*(2), 200-211. doi:10.1016/j.jpain.2016.10.014
- Hood, A., Pulvers, K., Carillo, J., Merchant, G., & Thomas, M. (2012). Positive traits linked to less pain through lower pain catastrophizing *Personality and Individual Differences, 52*(3), 401-405.
- Hossain, F., Baird, P., & Pardoe, R. (2013). Outcomes and community integration for veterans with disability: Early implementation of the Progressive Goal Attainment Program (PGAP) for veterans demonstration. *MDRC Policy Brief*. doi:http://www.mdr.org/project/progressive-goal-attainment-program-pgap-veterans#featured\_content
- Huang, F. Y., Chung, H., Kroenke, K., Delucchi, K. L., & Spitzer, R. L. (2006). Using the Patient Health Questionnaire-9 to measure depression among racially and ethnically diverse primary care patients *Journal of General Internal Medicine, 21*(6), 547-552.
- Kerns, R. D. (2010). Antidepressants combined with self-management of pain improves outcomes in people with comorbid pain and depression. *Evidence-based mental health, 13*(1), 13. doi:13/1/13 [pii] 10.1136/ebmh.13.1.13
- Kori, S., Miller, R., & Todd, D. (1990). Kinesiophobia: A new view of chronic pain behavior. *Pain Management (Jan)*, 35-43.
- Kreuter, M. W., & Wray, R. J. (2003). Tailored and targeted health communication: Strategies for enhancing information relevance. *American Journal of Health Behavior, 27*, S227 - S232.
- Kroenke, K., Spitzer, R., & Williams, J. (2001). The PHQ-9. *Journal of General Internal Medicine, 16*(9), 606-613.
- Kronstrom, K., Karlsson, H., Nabi, H., Oksanen, T., Salo, P., Sjosten, N., . . . Vahtera, J. (2011). Optimism and pessimism as predictors of work disability with a diagnosis of depression: a prospective cohort study of onset and recovery. *Journal of Affective Disorders, 130*(1-2), 294-299. doi:10.1016/j.jad.2010.10.003
- Kuijjer, W., Groothoff, J. W., Brouwer, S., Geertzen, J. H., & Dijkstra, P. U. (2006). Prediction of sickness absence in patients with chronic low back pain: a systematic review. *Journal of Occupational Rehabilitation, 16*(3), 439-467. doi:10.1007/s10926-006-9021-8
- Lang, A. J., Wilkins, K., Roy-Byrne, P. P., Golinelli, D., Chavira, D., Sherbourne, C., . . . Stein, M. B. (2012). Abbreviated PTSD Checklist (PCL) as a guide to clinical response. *General Hospital Psychiatry, 34*(4), 332-338. doi:10.1016/j.genhosppsych.2012.02.003
- Leeuw, M., Goossens, M. E., Linton, S. J., Crombez, G., Boersma, K., & Vlaeyen, J. W. (2007). The fear-avoidance model of musculoskeletal pain: current state of scientific evidence. *Journal of Behavioral Medicine, 30*(1), 77-94.
- Linton, S. J., Gross, D., Schultz, I. Z., Main, C., Cote, P., Pransky, G., & Johnson, W. (2005). Prognosis and the identification of workers risking disability: research issues and directions for future research. *Journal of Occupational Rehabilitation, 15*(4), 459-474.
- Linton, S. J., Nicholas, M. K., MacDonald, S., Boersma, K., Bergbom, S., Maher, C., & Refshauge, K. (2011). The role of depression and catastrophizing in musculoskeletal pain. *European Journal of Pain, 15*(4), 416-422. doi:10.1016/j.ejpain.2010.08.009
- Lotters, F., & Burdorf, A. (2006). Prognostic factors for duration of sickness absence due to musculoskeletal disorders. *Clinical Journal of Pain, 22*(2), 212-221.

- March, L. M., Cross, M. J., Lapsley, H., Brnabic, A. J., Tribe, K. L., Bachmeier, C. J., . . . Brooks, P. M. (1999). Outcomes after hip or knee replacement surgery for osteoarthritis. A prospective cohort study comparing patients' quality of life before and after surgery with age-related population norms. *Medical Journal of Australia*, *171*(5), 235-238.
- Martell, C. R., Dimidjian, S., & Herman-Dunn, R. (2010). *Behavioral activation for depression: A clinician's guide*. New York: Guilford.
- McWilliams, L., Cox, B., & Enns, M. (2003). Mood and anxiety disorders associated with chronic pain: An examination in a nationally representative sample. *Pain*, *106*, 127-133.
- Meichenbaum, D., & Turk, D. C. (1987). *Facilitating Treatment Adherence: A Practitioner's Guidebook*. New York: Basic Books.
- Melzack, R. (1987). The short-form McGill Pain Questionnaire. *Pain*, *30*, 191 - 197.
- Michalopoulos, C., Wittenburg, D., Israel, D., Schore, J., Warren, A., Zutshi, A., . . . Schwartz, L. (2011). *The accelerated benefits demonstration and evaluation project: Health and employment at 12 months*. In. Retrieved from [http://www.ssa.gov/disabilityresearch/documents/AB%20Vol%201\\_508%20comply.pdf](http://www.ssa.gov/disabilityresearch/documents/AB%20Vol%201_508%20comply.pdf)
- Millward, L. J., Lutte, A., & Purvis, R. G. (2005). Depression and the perpetuation of an incapacitated identity as an inhibitor of return to work. *Journal of Psychiatric Mental Health Nursing*, *12*(5), 565-573. doi:JPM875 [pii]. 10.1111/j.1365-2850.2005.00875.x
- Mohr, D. C., Hart, S. L., Julian, L., Catledge, C., Honos-Webb, L., Vella, L., & Tasch, E. T. (2005). Telephone-administered psychotherapy for depression. *Archives of General Psychiatry*, *62*(9), 1007-1014. doi:62/9/1007 [pii] 10.1001/archpsyc.62.9.1007
- Mohr, D. C., Vella, L., Hart, S., Heckman, T., & Simon, G. (2008). The Effect of Telephone-Administered Psychotherapy on Symptoms of Depression and Attrition: A Meta-Analysis. *Clinical Psychology*, *15*(3), 243-253. doi:10.1111/j.1468-2850.2008.00134.x
- Mondloch, M. V., Cole, D. C., & Frank, J. W. (2001). Does how you do depend on how you think you'll do? A systematic review of the evidence for a relation between patients' recovery expectations and health outcomes. *CMAJ*, *165*(2), 174-179.
- Morley, S., Eccleston, C., & Williams, A. (1999). Systematic review and meta-analysis of randomized controlled trials of cognitive-behavior therapy and behavior therapy for chronic pain in adults, excluding headache. *Pain*, *80*, 1-13.
- Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, *91*, 328 - 346.
- Picavet, H. S., Vlaeyen, J. W., & Schouten, J. S. (2002). Pain catastrophizing and kinesiophobia: predictors of chronic low back pain. *American Journal of Epidemiology*, *156*(11), 1028-1034.
- Rafferty, M. N., Murphy, A. W., O'Shea, E., Newell, J., & McGuire, B. E. (2013). Effectiveness of a cognitive behavioural therapy-based rehabilitation programme (Progressive Goal Attainment Program) for patients who are work disabled due to back pain: study protocol for a multicentre randomised controlled trial. *Trials*, *14*, 290 - 298.
- Rezai, M., & Cote, P. (2005). Which came first - the depression or the pain? *Linkages*.
- Rimer, B. K., & Matthew, W. K. (2006). Advancing tailored health communication: A persuasion and message effects perspective. *Journal of Communication*, *56*, S184 - S201.
- Ritter, M. A., Albohm, M. J., Keating, E. M., Faris, P. M., & Meding, J. B. (1995). Comparative outcomes of total joint arthroplasty. *The Journal of Arthroplasty*, *10*(6), 737-741.
- Rush, A. J., Polatin, P., & Gatchel, R. J. (2000). Depression and chronic low back pain: establishing priorities in treatment. *Spine*, *25*(20), 2566-2571.

- Schaafsma, F., Schonstein, E., Ojajarvi, A., & Verbeek, J. (2011). Physical conditioning programs for improving work outcomes among workers with back pain. *Scandinavian Journal of Work, Environment & Health*, 37(1), 1-5.
- Schade, V., Semmer, N., Main, C., Hora, J., & Boos, N. (1999). The impact of clinical, morphological, psychosocial and work-related factors on the outcome of lumbar discectomy. *Pain*, 80, 239-249.
- Schultz, I. Z., Crook, J. M., Berkowitz, J., Meloche, G. R., Milner, R., Zuberbier, O. A., & Meloche, W. (2002). Biopsychosocial multivariate predictive model of occupational low back disability. *Spine*, 27(23), 2720-2725.
- Scott, W., Wideman, T. H., & Sullivan, M. J. L. (2014). Clinically meaningful scores on pain catastrophizing before and after multidisciplinary rehabilitation: a prospective study of individuals with subacute pain after whiplash injury. *Clinical Journal of Pain*, 30(3), 183-190. doi:10.1097/AJP.0b013e31828eee6c
- Shearer, H. M., Carroll, L. J., Wong, J. J., Cote, P., Varatharajan, S., Southerst, D., . . . Taylor-Vaisey, A. L. (2015). Are psychological interventions effective for the management of neck pain and whiplash-associated disorders? A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMA) Collaboration. *The Spine Journal*, :doi:10.1016/j.spinee.2015.08.011
- Spitzer, W., LeBlanc, F., & Dupuis, M. (1987). A scientific approach to the assessment and management of activity-related spinal disorders: A monograph for clinicians. *Spine*, 12(Supp 75), S3-S59.
- Streltzer, J., Eliashof, B. A., Kline, A. E., & Goebert, D. (2000). Chronic pain disorder following physical injury. *Psychosomatics*, 41(3), 227-234. doi:10.1176/appi.psy.41.3.227
- Stucki, G., Liang, M. H., Stucki, S., Bruhlmann, P., & Michel, B. A. (1995). A self-administered rheumatoid arthritis disease activity index (RADAI) for epidemiologic research. Psychometric properties and correlation with parameters of disease activity. *Arthritis and Rheumatism*, 38(6), 795-798.
- Sullivan, M. D., & Robinson, J. P. (2006). Antidepressant and anticonvulsant medication for chronic pain. *Physical Medicine and Rehabilitation Clinics of North America*, 17(2), 381-400, vi-vii.
- Sullivan, M. J. L. (2003). Emerging trends in secondary prevention of pain-related disability. *Clinical Journal of Pain*, 19, 77 - 79.
- Sullivan, M. J. L., Adams, A., Stanish, W., & Savard, A. (2005). Les facteurs de risque de chronicite et le retour au travail suite aux blessures musculosquelletiques. *Pistes*, 7, 1-11.
- Sullivan, M. J. L., & Adams, H. (2010). Psychosocial treatment techniques to augment the impact of physiotherapy interventions for low back pain. *Physiotherapy Canada*, 62(3), 180-189. doi:10.3138/physio.62.3.180
- Sullivan, M. J. L., Adams, H., & Ellis, T. (2013). A psychosocial risk-targeted intervention to reduce work disability: Development, evolution and implementation. *Psychological Injury and Law*, 6, 1407 - 1415.
- Sullivan, M. J. L., Adams, H., Horan, S., Maher, D., Boland, D., & Gross, R. (2008). The role of perceived injustice in the experience of chronic pain and disability: scale development and validation. *Journal of Occupational Rehabilitation*, 18(3), 249-261. doi:10.1007/s10926-008-9140-5

- Sullivan, M. J. L., Adams, H., Martel, M. O., Scott, W., & Wideman, T. (2011). Catastrophizing and perceived injustice: risk factors for the transition to chronicity after whiplash injury. *Spine*, 36(25 Suppl), S244-249. doi:10.1097/BRS.0b013e3182387fed
- Sullivan, M. J. L., Adams, H., Rhodenizer, T., & Stanish, W. D. (2006). A psychosocial risk factor--targeted intervention for the prevention of chronic pain and disability following whiplash injury. *Physical Therapy*, 86(1), 8-18.
- Sullivan, M. J. L., Adams, H., & Sullivan, M. E. (2004). Communicative dimensions of pain catastrophizing: social cueing effects on pain behaviour and coping. *Pain*, 107(3), 220-226.
- Sullivan, M. J. L., Feuerstein, M., Gatchel, R., Linton, S. J., & Pransky, G. (2005). Integrating psychosocial and behavioral interventions to achieve optimal rehabilitation outcomes. *Journal of Occupational Rehabilitation*, 15(4), 475-489. doi:10.1007/s10926-005-8029-9
- Sullivan, M. J. L., & Main, C. (2007). Service, advocacy and adjudication: Balancing the ethical challenges of multiple stakeholder agendas in the rehabilitation of chronic pain. *Disability and Rehabilitation*, 29, 1596 - 1603.
- Sullivan, M. J. L., & Mankovsky, T. (2014). Psychological interventions: A conceptual perspective. In J. Strong, A. M. Unruh, A. Wright, & G. D. Baxter (Eds.), *Pain: A Textbook for Therapists*. Edinburg: Churchill Livingstone.
- Sullivan, M. J. L., Reesor, K., Mikail, S., & Fisher, R. (1992). The treatment of depression in chronic low back pain: Review and recommendations. *Pain*, 50, 5-13.
- Sullivan, M. J. L., & Simon, G. (2012). A telephonic intervention for promoting occupational re-integration in work-disabled individuals with musculoskeletal pain. *Translational Behavioral Medicine*, 2, 22-32.
- Sullivan, M. J. L., & Stanish, W. D. (2003). Psychologically-based occupational rehabilitation: the Pain-Disability Prevention Program. *Clinical Journal of Pain*, 19(2), 97-104.
- Sullivan, M. J. L., Thibault, P., Savard, A., & Velly, A. (2006). Pain and Function: A Psychosocial Perspective. In M. Feuerstein (Ed.), *Handbook of Cancer Survivorship*. New York, NY.: Springer.
- Sullivan, M. J. L., Thorn, B., Haythornthwaite, J. A., Keefe, F., Martin, M., Bradley, L. A., & Lefebvre, J. C. (2001). Theoretical perspectives on the relation between catastrophizing and pain. *Clinical Journal of Pain*, 17(1), 52-64.
- Tait, R. C., Chibnall, J. T., & Krause, S. (1990). The Pain Disability Index: psychometric properties. *Pain*, 40(2), 171-182.
- Tait, R. C., Pollard, C. A., Margolis, R. B., Duckro, P. N., & Krause, S. J. (1987). The Pain Disability Index: psychometric and validity data. *Archives of Physical Medicine and Rehabilitation*, 68(7), 438-441.
- Turner, J. A., Franklin, G., Fulton-Kehoe, D., Sheppard, L., Wickizer, T., Wu, R., . . . Egan, K. (2006). Worker recovery expectations and fear-avoidance predict work disability in a population-based workers' compensation back pain sample. *Spine*, 31(6), 682-689.
- Tutty, S., Ludman, E. J., & Simon, G. (2005). Feasibility and acceptability of a telephone psychotherapy program for depressed adults treated in primary care. *General Hospital psychiatry*, 27(6), 400-410. doi:S0163-8343(05)00113-1 [pii] 10.1016/j.genhosppsy.2005.06.009
- Vanderkooy, J. D., Kennedy, S. H., & Bagby, R. M. (2002). Antidepressant side effects in depression patients treated in a naturalistic setting: a study of bupropion, moclobemide, paroxetine, sertraline, and venlafaxine. *Canadian Journal of Psychiatry*, 47(2), 174-180. doi:10.1177/070674370204700208

- Vlaeyen, J. W., Kole-Snijders, A. M., Boeren, R. G., & van Eek, H. (1995). Fear of movement/(re)injury in chronic low back pain and its relation to behavioral performance. *Pain, 62*(3), 363-372.
- Vlaeyen, J. W., & Linton, S. J. (2000). Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. *Pain, 85*(3), 317-332.
- Volin, E., Fargo, J. D., & Fine, P. G. (2009). Opioid therapy for non-specific low back pain and the outcome of chronic work loss. *Pain, 142*, 194-201.
- Vowles, K. E., Gross, R. T., & Sorrell, J. T. (2004). Predicting work status following interdisciplinary treatment for chronic pain. *European Journal of Pain, 8*(4), 351-358.
- Waddell, G. (2004). *The Back Pain Revolution*. (Second ed.). Edinburgh.: Churchill Livingstone.
- Waddell, G., Aylward, M., & Sawney, P. (2002). Back pain, incapacity for work and social security benefits: an international literature review and analysis. *London: Royal Society of Medicine Press*.
- Waddell, G., Burton, A., & Main, C. (2003). *Screening to identify people at risk of long-term incapacity for work*. London, UK: Royal Society of Medicine Press.
- Warren, A. M., Jones, A. L., Bennett, M., Solis, J. K., Reynolds, M., Rainey, E. E., . . . Foreman, M. L. (2016). Prospective Evaluation of Post-traumatic Stress Disorder in Injured Patients With and Without Orthopaedic Injury. *Journal of Orthopaedic Trauma, 30*(9), e305-311. doi:10.1097/BOT.0000000000000623
- Wideman, T. H., Scott, W., Martel, M. O., & Sullivan, M. J. L. (2012). Recovery from depressive symptoms over the course of physical therapy: a prospective cohort study of individuals with work-related orthopaedic injuries and symptoms of depression. *Journal of Orthopaedic and Sports Physical Therapy, 42*(11), 957-967. doi:10.2519/jospt.2012.4182
- Wideman, T. H., & Sullivan, M. J. L. (2011). Differential predictors of the long-term levels of pain intensity, work disability, healthcare use, and medication use in a sample of workers' compensation claimants. *Pain, 152*(2), 376-383. doi:10.1016/j.pain.2010.10.044
- Williams, A. C. D. C., Eccleston, C., & Morley, S. (2013). Psychological therapies for the management of chronic pain (excluding headache) in adults. In *The Cochrance Collaboration*. New York.: Wiley and Sons.
- Yakovov, E., Scott, W., Stanish, W. D., Tanzer, M., Dunbar, M., Richardson, G., & Sullivan, M. J. L. (2018). Reductions in Perceived Injustice are Associated With Reductions in Disability and Depressive Symptoms After Total Knee Arthroplasty. *Clinical Journal of Pain, 34*(5), 415-420. doi:10.1097/AJP.0000000000000551