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SUMMARY

The Work Disability Diagnosis Interview (WoDDI) consists of a structured interview designed to help clinicians systematically identify the factors contributing to a work disability. It is one of few tools available in rehabilitation for use with individuals in the chronic phase of work disability. It takes into account the influence of various systems (personal, health care, workplace, and compensation), and was developed for the two main health problems associated with work disability: musculoskeletal disorders (MSDs) and common mental disorders (CMDs).

The aim of this study was to validate the WoDDI with individuals absent from work due to an MSD or a CMD. More specifically, it sought to describe the following psychometric properties of the instrument: (1) construct validity, (2) internal consistency, (3) interrater reliability, and (4) convergent validity.

A cross-sectional correlational design was used with a non-probability sample. The inclusion criteria for occupational therapists were (1) membership in the Ordre des ergothérapeutes du Québec, (2) at least one year's experience in work rehabilitation, and (3) prior specific training in the use of the WoDDI (average duration of four hours). The inclusion criteria for workers were (1) being absent from work for at least three months but less than two years due to an MSD or a CMD, (2) having a contractual relationship with their employer, and (3) being enrolled in a rehabilitation program. It took between 90 and 120 minutes to administer the WoDDI. In addition, for the purpose of evaluating the instrument's convergent validity, the participants completed self-report questionnaires measuring various related concepts. For a sub-group of participating workers, the occupational therapists also completed (between 24 and 72 hours after administering the WoDDI) an inventory of causes of work disability maintenance (n=72 for the MSD version and n=65 for the CMD version). Lastly, to assess interrater reliability for the two populations under study, six occupational therapists used the WoDDI to score standardized case histories.

In total, 35 occupational therapists took part in the evaluation of 290 participating workers, including 140 with an MSD and 150 with a CMD. Regarding the exploratory factor analysis (EFA) of the instrument's construct validity, the results revealed similar dimensions in both versions, specifically, illness representation, clinical judgment of the seriousness of the medical condition, and high levels of work demands. This analysis made it possible to reduce the number of items in the instrument by approximately 20 to 40%, depending on the version. However, the varying results obtained from the EFA for the internal consistency of certain dimensions suggest certain limitations, mainly for the version designed for the CMD population. Interrater reliability was satisfactory as regards the nature of the instrument (i.e., a structured interview). Lastly, given the lack of a standard measure, the convergent validity still has to be confirmed.

In summary, despite the WoDDI's reported limitations, by reducing the number of items included, its content appears to correlate well with the current scientific literature on the two populations under study. It also fits in with a biopsychosocial understanding of individuals on work disability. However, the CMD version of the instrument requires revision and retesting.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF INITIALISMS AND ABBREVIATIONS

CMD:	Common mental disorder
EFA:	Exploratory factor analysis
FCE:	Functional capacity evaluation
MSD:	Musculoskeletal disorder
RTW:	Return to work
WDI:	Work disability indicator
WoDDI:	Work Disability Diagnosis Interview

1. INTRODUCTION AND CURRENT SCIENTIFIC KNOWLEDGE

1.1 Magnitude of the Problem

Work disability affects a large proportion of the population. The rate of work absence among full-time Canadian employees rose constantly in Canada between 2001 and 2011, going from 5.3% to 5.9% in one decade. In Québec, in 2011, this rate was slightly higher, at 6.5% (Dabboussy and Uppal, 2012). The health problems most often associated with work disability to date are musculoskeletal disorders (MSDs) such as thoracolumbar pain, carpal tunnel syndrome, and cervicodynia) and common mental disorders (CMDs) such as depression, generalized anxiety, and adjustment disorders (Mental Health Commission of Canada [MHCC], 2013; Institut de la statistique du Québec [ISQ], 2015; Deraspe, 2013; Towers Watson, 2010).

From a purely economic standpoint, work disability is associated with substantial direct costs. Combining work-related accidents with occupational diseases, the annual loss is estimated at 4% of the world's GDP (International Labour Organization, 2013). However, work disability is also associated with high indirect costs, including that of replacing absent workers. For example, the indirect costs of MSDs represent more than double the direct costs annually in the United States (Institute of Medicine [IOM] and National Research Council [NRC], 2001). Likewise, in France, a case study of three companies, each with over 500 employees, reported that the indirect costs of MSDs were 10 to 30 times higher than the direct costs (European Agency for Safety and Health at Work [EU-OSHA], 2010). In another study on the CMD costs associated with the employees of an American company with over 4,000 employees, the indirect payouts represented more than half (53%) of all the costs (Johnston, Westerfield, Momin, Phillippi and Naidoo, 2009).

A Canadian study estimated the annual cost of productivity losses associated with CMDs at $17.7 billion (Lim, Jacobs, Ohinmaa, Schopflocher and Dewa, 2008). In addition, while the incidence of work absenteeism appears to have dropped slightly in the past few years, the indirect costs continue to rise. In Québec, in 2010, the Commission de la santé et de la sécurité du travail[2] (CSST) accepted 92,112 industrial accident and occupational disease claims. The compensation benefits paid out totalled $1.78 billion. Five years later, even though the CSST accepted fewer claims (87,618), the benefits paid out had increased by over 8%, for a total of $1.93 billion. It therefore appears that occupational injuries and diseases were fewer in number, but increasingly costly (Commission de la santé et de la sécurité du travail [CSST, 2011); Commission des normes, de l'équité, de la santé et de la sécurité du travail [CNESST], 2016; Duguay, Busque, Boucher, Lebeau and Prud'homme, 2017).

Furthermore, as stated in a report from the United Kingdom's Department for Work and Pensions, improving the health of the labour force appears essential to ensure economic growth and greater social justice (Black, 2008). In fact, when a worker is absent from work, it has numerous repercussions on a vast, interrelated system. Not only does it affect the worker and his[3] family, but also the employer, who is faced with productivity and profitability constraints. A worker's absence often creates a work overload for his coworkers, which in turn exposes them

[2] The Commission de la santé et de la sécurité du travail (CSST) became the Commission des normes, de l'équité et de la santé et de la sécurité du travail (CNESST) on January 1, 2016.

[3] The masculine gender is used throughout this document solely to facilitate reading and has no discriminatory intent.

to risk factors that could lead to them developing health problems (MacPhee, Dahinten and Havaei, 2017; Bowling, Alarcon, Bragg and Hartman, 2015). Work disability does not therefore affect only one person, but society as a whole.

The *Rapport du groupe de travail québécois sur les aspects cliniques des affections vertébrales chez les travailleurs* (report of the Québec task force on the clinical aspects of workers' spinal disorders*)*, commonly called the Spitzer Report, highlighted the fact that 7% of work-related thoracolumbar pain evolved toward a work absence of more than six months, and that these chronic cases accounted for 75% of the costs related to thoracolumbar pain-related compensation (Spitzer, Leblanc and Dupuis, 1987). Several studies on the effectiveness of work rehabilitation programs have been published since the Spitzer Report. A recent systematic review by Van Vilsteren *et al.* (2015) showed that such programs, which included an early intervention in the workplace, significantly shortened work absence duration relative to that associated with the usual treatment. This applied to both MSDs and CMDs. A realist review conducted in 2017 by Durand *et al.* identified the effective components of work rehabilitation programs. One of these components was the multi-dimensional evaluation of the worker at the start of case management. More specifically, the study stated that to facilitate the return to work (RTW), it is essential to evaluate the individual's affective, cognitive, and physical dimensions, but also to explore and improve understanding of aspects of the person's work activity (demands, working conditions, and obstacles). It is therefore an opportune time to look for measurement instruments that reflect this holistic view of the worker.

1.2 Current Scientific Knowledge

A number of measurement instruments pertaining to work disability have been developed in recent decades, notably to help clinicians better understand patients' conditions and needs. These instruments can be grouped into four main categories: (1) self-report questionnaires, (2) functional capacity evaluations, (3) observation tools, and (4) structured interviews.

1.2.1 Self-report questionnaires

A wide variety of self-report questionnaires exist for measuring people's perceptions regarding specific concepts. These questionnaires are generally quick to administer and useful for screening large numbers of cases; they also require no prior training. However, they are not always applicable to a large population, particularly due to cultural and language barriers. Various studies have shown that the results of questionnaires on different measured concepts did not always correspond to the objective measures of the phenomena (Innes and Hardwick, 2010; Jakobsen, Sundstrup, Persson, Andersen and Andersen, 2014; Liu, Eaton, Driban, McAlindon and Lapane, 2016). For example, the worker may perceive the work demands as higher than they in fact are.

The main goal of these questionnaires is to describe a phenomenon related to personal factors, such as disability (by way of example, the Roland-Morris Questionnaire, DASH Questionnaire, and Oswestry Questionnaire), fears, psychological distress (Fear-Avoidance Beliefs Questionnaire, Psychological Distress Inventory), pain (McGill Pain Questionnaire) or quality of life (World Health Organization Quality of Life, Quality of Working Life Systemic Inventory (QWLSI©), and Short-Form Health Survey Questionnaire (SF-36)). Other questionnaires have also been developed to evaluate the perception of environmental factors such as the physical

characteristics of work (CSHA – Risk Factor Questionnaire), psychosocial risks at work (Job Content Questionnaire (JCQ), Occupational Stress Inventory – Revised, performance at work (Occupational Role Questionnaire) and organizational factors (Organizational Practices and Policies Questionnaire). Recently, Corbière *et al.* (2016) developed and validated ROSES, a questionnaire combining evaluation of the obstacles to the RTW and the person's self-efficacy in overcoming them. This questionnaire is particularly original as it combines two dimensions that are central to the RTW.

There are also questionnaires aimed primarily at early screening for workers at risk of developing a long-term disability. They are generally used during the acute or sub-acute phase of the health problem. These questionnaires describe mainly the psychosocial factors recognized as influencing the duration of work disability. They were developed above all for a population of workers suffering from back pain or pain in the upper extremities (Truchon *et al.*, 2012; Truchon *et al.*, 2010).

All told, the scientific literature abounds with self-report questionnaires that document various facets – generally one at a time – of workers' perception of their health condition and work environment.

1.2.2 Functional capacity evaluations

Functional capacity evaluations (FCEs) usually consist of a battery of tests measuring a worker's maximum capacities according to certain physical demands of the work: load handling; sitting, standing and/or walking tolerance; manual dexterity; capacity to maintain awkward positions (tilting, squatting), etc. (James, Reneman and Gross 2016; Schonstein and Kenny, 2001; Hart, Isernhagen and Matheson, 1993; Innes and Straker, 1998). These evaluations are generally carried out in a clinical setting and can last from a few hours to a few days. FCEs utilize various methods to collect data, such as standardized tests and role-plays that involve simulating work tasks. Job-specific and general FCEs exist (James *et al.*, 2016; Bieniek and Bethge, 2014; Innes and Straker, 2002).

A specific FCE measures a person's capacities in terms of the particular tasks and demands associated with a given job (for example, an office job). A general FCE measures the person's capacities according to the general demands of the job. In addition, some FCEs are developed for specific pain sites, such as back pain (Van Der Meer, Trippolini, Van Der Palen, Verhoeven and Reneman, 2013), neck pain (Trippolini, Reneman, Jansen, Dijkstra and Geertzen, 2013), or pelvic impairments following a motor vehicle accident (Ratzon, Shevil, Froom, Friedman and Amit, 2013). FCEs require specialized equipment and training for the evaluators. A number of studies exist on the psychometric properties of FCEs. However, given the wide variety of instruments available, it remains difficult to form a clear picture of these properties (Bieniek and Bethge, 2014; Gouttebarge, Wind, Kuijer and Frings-Dresen, 2004). Moreover, the results of FCEs are used to achieve highly varied goals, ranging from making a pre-employment assessment to determining rehabilitation needs or estimating compatibility with the pre-injury job (James *et al.*, 2016)

In summary, a wide variety of FCEs exist that evaluate mainly physical capacities. They focus on the individuals involved, but pay little heed to the psychosocial factors that can influence the RTW. Yet this class of tools is still extensively used by health professionals working with individuals who have an MSD.

1.2.3 Observation tools

Observation tools are used primarily in the rehabilitation context for evaluation purposes. They usually involve a protocol suggesting points to be observed by the professional during the performance of real work tasks by a person in his actual work environment. The main strength of this category of tools is their ecological validity. However, they are generally harder to use than other types of tools due to the high costs of administering them (time and resources) and the obligation to obtain the agreement of the various stakeholders in the workplace. Only a few observation tools have been the subject of scientific publications. For example, one of the best known is the Assessment of Work Performance (AWP) (Sandqvist, Tornquist and Henriksson, 2006). This tool is generic and available in Swedish, English, and Dutch. Its psychometric properties have been the focus of several studies (Karlsson, Liedberg and Sandqvist, 2017; Fan, Taylor, Ekbladh, Hemmingsson and Sandqvist, 2013; Sandqvist, Björk, Gullberg, Henriksson and Gerdle, 2009; Sandqvist, Gullberg, Henriksson and Gerdle, 2008). According to Karlsson *et al.* (2017), occupational therapists report that this type of tool provides the best evaluation of a person's work potential, but remains difficult to use.

In short, while observation allows in-depth analysis directly linked to real work tasks, very few standardized tools of this type exist. Their use entails substantial costs and depends on the agreements in place with the employer.

1.2.4 Structured interviews

Structured interviews are used mainly for evaluation purposes to gain a better understanding of the workers' condition and needs, identify obstacles in the workplace, determine rehabilitation needs, develop intervention objectives, and monitor the worker's progression. Interviews require more time and human resources than self-report questionnaires. In rehabilitation, interviews are generally used when the work disability extends beyond the usual recovery time. They allow clinical judgments to be formed that integrate the interaction among the various dimensions evaluated. Thus, compared to the other categories of tools, they allow an in-depth evaluation of the determinants of the work disability.

However, compared to the three aforementioned categories of tools, far fewer structured-interview tools are found in the literature. One of the first of these is the Worker Role Interview (WRI), a structured interview guide used to identify workers' perceptions of the psychosocial and environmental factors influencing their ability to return to work (Velozo *et al.*, 1999). This guide has been translated into several languages, has good psychometric properties, and is general in nature, meaning that it can be used for various health problems (Yngve and Ekbladh, 2011, 2015; Egan *et al.*, 2015; Forsyth *et al.*, 2006). However, it does not evaluate clinical factors or consider the interaction among the person-related and environment-related variables. A second such tool is the Dialogue About Ability Related to Work (DOA), which is designed to determine the factors influencing the capacity to work (Linddahl, Norrby and Bellner, 2003; Norrby and Linddahl, 2006). It consists of a self-report questionnaire and a structured interview regarding the client's ability to perform the work activities, and was developed for a population with mental health problems. It comes in English and Swedish versions and has good psychometric properties (Linddahl *et al.*, 2003; Norrby *et al.*, 2006).

Lastly, there is the Work Disability Diagnosis Interview (WoDDI), which was developed by a Québec team to help professionals identify systematically all the factors that maintain the work disability and devise a personalized intervention plan (Durand, Loisel, Hong and Charpentier, 2002). To the best of the authors' knowledge, the WoDDI is one of the rare tools designed for direct use in the planning of work rehabilitation programs for individuals characterized by a long-term work absence (chronic phase). It identifies all the disability maintenance factors at play and the obstacles to the RTW that explain the long-term work absence. These factors relate not only to the worker, but also to the workplace, insurer, and even health professionals. This tool is available for the two main health problems associated with work disability and absenteeism, namely, CMDs (Durand *et al.*, 2010) and MSDs (Durand *et al.*, 2002). As well, it combines a structured interview with self-report questionnaires that allow data triangulation (Durand, Coutu and Hong, 2014). Lastly, it is one of few tools available in French and adapted to the Québec health-care and compensation systems. However, to date, the WoDDI's psychometric properties have only been partially described (Durand *et al.*, 2002).

1.3 Work Disability Diagnosis Interview (WoDDI)

The main aim of the WoDDI, which is described in greater detail here, is to rule out a serious diagnosis and identify the cause(s) maintaining the work disability or any condition rendering the RTW more difficult. Based on the results, a personalized intervention plan can be established and an order of priority determined for the intervention targets. The study by Marois and Durand (2009) on the effect of identifying these factors, at the start of a rehabilitation program, using the WoDDI suggests that this tool allows clinicians to quickly personalize their intervention and take more effective action. Validation studies of this tool are therefore needed.

The conceptual framework used to develop this tool was the *Processus de production de handicap* (PPH, or handicap production process[4] (Fougeyrollas, 1991). Developed by the Quebec Committee on the International Classification of Impairments, Disabilities and Handicaps (QCICIDH)[5], this model looks at disability as the situational result of an interactive process between a person's characteristics and those of the environment. The DCP's conceptual framework defines the disability situation using the QCICIDH definition, according to which the adoption or not of a lifestyle habit, i.e., a daily activity or a social role that ensures the person's survival and fulfillment in society throughout his lifetime, results from the interaction between, on the one hand, the impairment of the person's organic systems and capabilities (abilities and disabilities), and on the other hand, environmental factors, (Fougeyrollas, Cloutier, Bergeron, Côté and St-Michel, 1998). In the rehabilitation context, the "work disability situation" is thus defined as the result of an unfavourable interaction between personal factors and environmental obstacles, including the workplace, the administrative compensation system, and the health care system. This situation prevents the adoption of a lifestyle habit, one that is important for adults, namely, work.

In this study, severity indicators and work disability indicators (WDIs) were identified based on the scientific literature and clinical expertise. Severity indicators are clues that suggest a serious pathology requiring specific medical care. Work disability indicators provide clues as to the causes maintaining a work disability, which may be physical, psychosocial, occupational, clinical, or administrative in origin. The WoDDI includes open-ended and closed questions on

[4] Translator's note: Now called the disability creation process, or DCP.
[5] Translator's note: Now called the International Network on the Disability Creation Process, or INDCP.

factors grouped into main categories, in order to help clinicians detect the WDIs at play and severity indicators.

The WoDDI was originally developed in 1997, in the context of the PRÉVICAP work rehabilitation clinic for workers with MSDs (Durand *et al.*, 2002). It was developed by a panel of experts based on their experience and analysis of the data in the scientific literature. The WoDDI-MSD encompasses 57 WDIs grouped into three main categories – "personal," "administrative," and "environmental" – that include 32, 11, and 14 indicators respectively. The tool takes the form of a structured interview divided into eight sections, each with the corresponding WDIs: (1) prior and current health condition, (2) pain syndrome, (3) lifestyle habits, (4) socio-familial background, (5) financial situation, (6) work environment, (7) worker's perceptions and expectations, and (8) results analysis and recommendations. In addition to the structured interview of the worker, self-report questionnaires are provided to clinicians to use as needed in order to obtain more information about certain WDIs. These are the Roland-Morris Disability Questionnaire for Low Back Pain (Roland and Fairbank, 2000), the Neck and Upper Limb Index (NULI) (Stock *et al.*, 2004), Job Content Questionnaire (JCQ) (Karasek *et al.*, 1998), Psychological Distress Inventory (PDI) (Préville, Boyer, Potvin, Perrault and Légaré, 1992), and the Tampa Scale for Kinesiophobia (French, Roach and Mayes, 2002).

In 2010, the WoDDI was adapted for use with a population of workers off work for CMDs (Durand *et al.*, 2010). The WoDDI-CMD covers a total of 48 WDIs grouped into four main categories, namely, "sociodemographic," "clinical," "administrative," and "occupational", including 6, 14, 4, and 24 WDIs respectively. In the context of the interview, the WDIs are divided into seven sections: (1) prior and current health conditions, (2) lifestyle habits, (3) socio-familial background, (4) financial situation, (5) work environment, (6) worker's perceptions and expectations, and (7) results analysis and recommendations. In addition to the interview with the worker, two complementary tools are proposed and can be used to support the diagnosis and assess the person's functional capacities: the Psychological Distress Inventory (PDI) (Préville *et al.*, 1992) and the Job Content Questionnaire (JCQ) (Karasek *et al.*, 1998).

The WoDDI represents a first attempt to improve interventions with absent workers by adopting a holistic approach to the problem. This tool was developed through a rigorous process incorporating both scientific and practical knowledge (Durand *et al.*, 2010). It takes into account all the personal, medical, work environment, and insurer systems that help create, maintain, or reduce long-term work disability. The WoDDI is part of a comprehensive evaluation of workers and offers practitioners a systematic process for identifying the factors at play.

Previously, only the face validity of the WoDDI-MSD had been studied. A judgment had been made by WoDDI users about its pertinence, format, questions and rating scales, and about the comprehensibility of the interview guides (Durand *et al.*, 2002). In the context of the current study, the main objective was to study the WoDDI's psychometric properties. This evaluation constitutes an essential step for all measurements instruments if they are to be recognized as valid. In fact, it is important that a tool have good psychometric properties to ensure that different clinicians can properly measure the targeted concept in varying contexts. It is also important that the measures not be obtained randomly, and that they detect changes in the particular condition of a given individual.

2. RESEARCH OBJECTIVES

The main objective of this study was to evaluate the psychometric properties of both versions of the WoDDI, i.e., one for assessing workers with a musculoskeletal disorder (WoDDI-MSD) and the other, for assessing workers with a common mental disorder (WoDDI-CMD). The following four psychometric properties were therefore evaluated for each version:

- factorial construct validity;
- internal consistency;
- interrater reliability; and
- convergent validity.

3. METHODOLOGY

3.1 Study Design and Population

This study consisted of a development study aimed at improving a measurement instrument. A cross-sectional correlational design was used, and involved exploring correlations among variables (Contandriopoulos, Champagne, Potvin, Denis and Boyle, 1990; Fortin and Gagnon, 2016).

The researchers had access to a non-probability convenience sample (Contandriopoulos *et al.*, 1990). Analysis of the psychometric property that required the largest number of participants – namely, factorial construct validity – was used to determine the overall sample size. Several articles on the determination of sample size for factor analyses can be found in the literature (Costello and Osborne, 2005; MacCallum, Widaman, Preacher and Hong, 2001; Osborne and Costello, 2004; Sapnas and Zeller, 2002). Various criteria were identified as influencing the required sample size, such as the factor loadings, number of items on the questionnaire, nature of the data, and communality of the different variables, i.e., the share of common variance among the variables (Costello and Osborne, 2005; MacCallum *et al.*, 2001). When the communality is high, a smaller sample size is required (MacCallum *et al.*, 2001). Although the WoDDI includes a large number of items (WDIs), several of them concern similar dimensions. A sample size of 150 participants for each impairment (150 MSD participants and 150 CMD participants) was therefore deemed sufficient for the study of the exploratory factorial validity (Corbière, 2014; Corbière and Fraccaroli, 2014; Guadagnoli and Velicer, 1988; Hutcheson and Sofroniou, 1999). The data collected for the factorial construct validity analysis was also used to evaluate internal consistency (Corbière, 2014; Corbière and Fraccaroli, 2014).

The participants were selected by applying the following inclusion criteria:

- between 18 and 65 years of age;
- ability to speak and read French;
- absent from work for at least three months but less than two years due to an MSD[6] or a CMD[7]; and
- have maintained their contractual relationship with their employer;
- held a regular full-time or part-time job for at least one year prior to the work absence.

[6] In this study, MSDs were defined as [translation] “a set of symptoms and inflammatory or degenerative impairments affecting the following body segments: the neck, back, upper extremities or lower extremities. These problems affect different structures such as tendons, muscles, ligaments, synovial sheaths and joints, including intervertebral discs. The associated nerves and blood vessels may also be affected.” (Comité provincial des représentants en ergonomie [CPRE], 2007).

[7] CMDs are common psychological or behavioural disorders with moderate symptoms that are clearly defined in time (Drouin, 2011). The most frequent are (1) adjustment disorders, (2) mood disorders (major depression), and (3) anxiety disorders (generalized anxiety disorder, panic disorder with or without agoraphobia) (Nieuwenhuijsen, Verbeek, Siemerink and Tummers-Nijsen, 2003).

The exclusion criterion was:

- having an MSD related to a specific pathology (e.g., metabolic, neoplasic, inflammatory, or infectious disease) or a serious CMD (e.g., schizophrenia).

Few studies have investigated methods of computing the power of kappa coefficients (Crewson, 2005) to determine the sample size required for measuring interrater reliability. By convention, it is acknowledged that 30 pairs (i.e., to compare the results obtained by two raters for the same case) is an acceptable number for studying the interrater reliability of measurement instruments with categorical variables (Crewson, 2005; Lacy and Riffe, 1996).

The raters in our study had to have a licence to practice as an occupational therapist (members of the Ordre des ergothérapeutes du Québec) and at least one year‘s experience in work rehabilitation. They received training from the principal investigator, Marie-José Durand. The training lasted an average of four hours and included a presentation of the instrument and its rating scale, as well as numerous exercises in the form of case histories. More specifically, for each case history, the raters had to list the most prevalent WDIs. Next, their answers were corrected and any discrepancies with the trainer’s answers were discussed. By the end of the training, each participant’s list had to obtain a 75% level of agreement with the trainer’s list. If it did not, the occupational therapists were given one or more additional case histories until the 75% level was reached.

3.2 Sociodemographic Variables

Data were collected on the following variables to describe the sample and provide the basic data needed to assess the instrument’s psychometric properties: (1) the raters’ sociodemographic variables and (2) the participants’ sociodemographic and health-related variables.

3.2.1 Raters’ sociodemographic variables

Sociodemographic data on the raters were collected on the day of training given by the project’s principal investigator. These data concerned their sex, age, education, principal place of practice (private or public), number of years of experience as an occupational therapist. and number of years of experience in work rehabilitation.

3.2.2 Participants’ sociodemographic and health-related variables

A questionnaire was used to describe the participants’ characteristics. The following information was collected: sex, age, education, socio-familial situation, job title, activity sector, date of accident (if applicable), work absence duration, job tenure, previous CMD or MSD history, comorbidity(-ies), and medical diagnosis on record in connection with the current work absence. The diagnosis was classified according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) for participants with a CMD. The job titles were taken from the National Occupational Classification (NOC), developed jointly by Employment and Social Development Canada and Statistics Canada, and revised in 2016. The economic activity sectors were presented according to the North American Industry Classification System (NAICS) of Statistics Canada, as revised in 2017.

3.3 Variables and Instruments Used to Assess Convergent Validity

3.3.1 Work disability situation

The work disability situation was assessed using the two versions of the WoDDI (WoDDI-MSD and WoDDI-CMD), as described in the Current Scientific Knowledge section. The occupational therapist conducted the interview, and identified and weighted the WDIs that emerged. The weighting involved a clinical reasoning process to establish the relative weight (level of importance) of each WDI in the prolongation of the person's work absence. The WDIs were then put in order of importance, and only the most heavily weighted determinants were retained. These are reported in the next section (Results Analysis and Recommendations). A five-level scale was used. The following question was asked for each WDI: "how likely is it that this indicator will contribute to maintaining the work disability?", where 0 = the indicator is not present, 1 = highly unlikely, and 4 = highly likely. It was decided in our study that the WDIs with a score of either 3 or 4 would be retained to develop a personalized rehabilitation plan. The WDIs are described in Appendix A.

3.3.2 Stress at work

Stress at work was assessed using the Job Content Questionnaire (JCQ) (Karasek *et al.*, 1998; Karasek *et al.*, 1985; Karasek and Theorell, 1990). This self-report questionnaire is composed of 29 items divided into three scales: psychological demands, decision latitude, and social support (Johnson and Hall, 1988). The psychological demands scale (9 items) measures workers' perceptions of the amount of work they have to perform, the mental demands, and the time constraints related to their work. The decision latitude scale comprises two sub-scales: decision authority (3 items) and skill discretion (6 items). These two sub-scales assess workers' ability to make decisions about how their work is carried out and to influence the related decisions, but also their perception of the opportunities available to them for using their skills, developing new ones, and doing work involving varied tasks and allowing creativity. Social support comprises two sub-scales: social support from supervisors (5 items) and social support from coworkers (6 items). All the items on this scale allow three components of social support from direct supervisors and coworkers to be measured (Bourbonnais and Mondor, 2001). Lastly, the higher the scores, the higher the psychological demands, decision latitude, and social support. Two cut-off scores are proposed: if the score on the decision latitude subscale is equal to or less than 72, it is considered low; if the score on the psychological demands subscale is higher than or equal to 24, it is considered high ($\geq$ 24). While this questionnaire is generally used with a population that is at work, it was deemed pertinent for assessing the convergent validity of certain WoDDI questions that corresponded to the work activity when the work absence began. The French versions of the psychological demands and decision latitude subscales have been validated (Larocque, Brisson and Blanchette, 1998). The Cronbach's alpha coefficients obtained ranged from 0.58 to 0.85, thus supporting the instrument's internal consistency. The discriminant validity was also found to be satisfactory (Larocque *et al.*, 1998).

3.3.3 Psychological distress

Psychological distress was assessed using the Psychological Distress Inventory (PDI), a self-report questionnaire adapted from the Psychiatric Symptom Index (Ilfeld, 1976). It measures the various dimensions of psychological distress, i.e., negative reactions to stress such as

depressive or anxious symptoms, anger, and attention and concentration problems. The short version of this questionnaire is composed of 14 questions. The respondent has to answer each question on a four-level frequency rating scale ranging from “never” to “very often.” The PDI is designed for a general population and is one of the questionnaires that was used for the Enquête Santé Québec health survey. Respondents with a score higher than 30.95 fall into the 85th percentile, indicating severe psychological distress. The PDI has shown good internal consistency (Cronbach’s alpha = 0.89) (Préville *et al.*, 1992). One study also established that the PDI has good convergent validity with affective and cognitive symptoms (Préville, Potvin, Boyer and Boulerice, 2000).

3.3.4 Perception of disability (back)

The Roland-Morris Questionnaire, used regularly in the work rehabilitation field, was utilized to measure workers’ perception of their disability. This questionnaire is a modified version of the Sickness Impact Profile (a generic measure of state of health) developed specifically for back problems. It is a self-report questionnaire composed of 24 statements concerning the physical and psychological impact of back pain. The respondent has to check off the statements that pertain to his current condition. The usual cut-off score for establishing a perception of major disability is 50 or over (Roland and Fairbank, 2000). The test-retest reliability of the Roland-Morris Questionnaire is good (ICC ranging from 0.72 to 0.91), as is its internal consistency (Cronbach’s alpha ranging from 0.84 to 0.93) (Roland and Fairbank, 2000). Moreover, it is responsive to change measured after rehabilitation treatments, particularly for a population with a low level of disability (Leclaire, Blier, Fortin and Proulx, 1997; Stratford, Binkley, Solomon, Gill and Finch, 1994). This instrument is recommended for use in research on back problems in order to standardize the measurement of results in this population (Deyo *et al.*, 1998). A French-language version of the Roland-Morris Questionnaire was developed by Coste, Le Parc, Berge, Delecoeuillerie and Paolaggi (1993).

3.3.5 Perception of disability (upper extremities and neck)

The Neck and Upper Limb Index (NULI-20) was retained to measure disability in the individuals with an upper extremity or neck problem. This questionnaire comprises 20 items that evaluate the impacts of neck and upper limb musculoskeletal injuries on work, physical activities, sleep, and psychosocial dimensions, as well as the iatrogenic effects on the persons affected. The scale ranges from 1 – no difficulty at all, to 7 – cannot do, with an added possibility for respondents to specify that the question does not apply to them or that they do not know. The higher the score (maximum of 7), the bigger the perceived disability. Results have shown that the NULI-20 has high test-retest reliability (ICC ranging from 0.83 to 0.85), excellent internal consistency (Cronbach’s alpha of 0.92), and very robust responsiveness to change (standardized response mean of 1.74). This instrument also has good convergent validity, judging from correlations with several objective and subjective measures of physical examinations and pain, and with generic measures of state of health. In construct validation studies, the NULI-20 was also found to significantly discriminate between people absent from work and those who were working (Stock *et al.* 2004). The NULI-20 thus provides a reliable and valid assessment of the specific impacts related to musculoskeletal injuries involving the neck and upper extremities.

3.3.6 Kinesiophobia

This concept, which refers to the fear of movement and re-injury, was assessed using the Tampa Scale of Kinesiophobia (TAC). The original version of this questionnaire had 17 items (Vlaeyen, Kole-Snijders, Boeren and Van Eek, 1995), and an 11-item version was also developed (Woby, Roach, Urmston and Watson, 2005). Each item is rated on a 4-point Likert scale, where 1 means "strongly disagree" and 4 means "strongly agree" with the statement. A study by Vlaeyen *et al.* (1995) showed the instrument to have good reliability and concomitant validity. Positive correlations between fear of movement and fear of re-injury have been observed using measures related to the concept of pain and affective distress (fear, depression). Moreover, a French-Canadian version of the instrument was adapted by the Université de Moncton and showed adequate results for internal consistency (Cronbach's alpha = 0.71) and construct validity. For both of these, an association was obtained between the TSK score and measures of pain, disability, depression, anxiety, and RTW (French *et al.*, 2002). The 11-item version of the TSK also has acceptable psychometric properties: internal consistency (Cronbach's alpha = 0.79), interrater reliability (ICC = 0.81), convergent validity (correlation of 0.60 with the Pain Catastrophizing Scale) and responsiveness to change (standardized response mean = 1.1) (Hapidou *et al.*, 2012; Tkachuk and Harris, 2012; Woby *et al.*, 2005). For the 11-item version, there is no cut-off score establishing a clear distinction between high and low levels of kinesiophobia (Larsson *et al.*, 2016). However, the closer the score is to the maximum possible of 44 points, the higher the level of kinesiophobia.

3.3.7 Causes of work disability maintenance

Given the lack of a questionnaire that could be used as a standard measure at the beginning of this study, an inventory of causes of work disability maintenance was developed, one specifically for MSDs and another for CMDs. First, the researchers formulated questions corresponding to the WDIs for each of the two versions of the WoDDI. The questions corresponded to one or more WDIs, depending on the conceptual proximity of the indicators. Next, the two inventories were pre-tested with three occupational therapists, whose comments were collected. New versions of the inventories were then developed, taking their comments into account. The Inventory of Causes of Work Disability Maintenance[8] for MSDs included 15 dimensions covering 43 WDIs, while the Inventory for CMDs included 19 dimensions covering 39 WDIs. A 10-point numeric rating scale was used for each question under study, ranging from 0 – no impact in terms of prolonging work absence duration, to 10 – maximum impact in terms of prolonging work absence duration. In addition, an answer of "not applicable" was available if the dimension measured was absent.

3.4 Recruitment and Data Collection

Data were collected from the participants accepted into rehabilitation programs offered by public or private Québec organizations. For each participant potentially eligible to take part in this study, the occupational therapists contacted a research professional, who verified the person's eligibility. Each eligible participant was then assessed, using the WoDDI, by the occupational therapist assigned to treat the person. It took from 90 to 120 minutes to administer the WoDDI. To assess the convergent validity, the participants were also asked to fill out complementary

[8] Translator's note: To date, there is only a French-language version of this inventory. An English courtesy translation of the title has been used in this report for easier readability.

questionnaires at the end of the interview (see sub-section 3.3). In addition, for a sub-group of participants from each population, the occupational therapist completed the Inventory of Causes of Work Disability Maintenance within 24 to 72 hours of administering the WoDDI, without the aid of notes. To assess interrater reliability, for each of the two populations under study, six previously trained occupational therapists were recruited to score standardized case histories using the WoDDI. To participate in this step, the raters had to have completed at least five assessments for one of the two populations under study, and to be available for a pre-determined two-week period near the end of the research calendar. The occupational therapists participating in this step were recruited for only one population.

3.5 Statistical Analyses

Descriptive analyses (frequencies, ranges, means, and standard deviations) were used to describe the participants' and raters' characteristics, and the scores obtained on the WoDDI. The data were compiled in a Microsoft Access data entry template, for later conversion into Excel spreadsheets (Microsoft Office 2016). Two software programs were used to carry out the statistical analyses: SAS 9.4 and SPSS 23.0.

3.5.1 Factorial construct validity analysis

Principal component exploratory factor analysis (EFA) was performed. EFA allows the conceptual dimensions inherent in a construct to be analyzed and the number of statements belonging to each of the dimensions to be reduced, in order to reflect the essence of a construct relating to the principle of parsimony (Corbière and Fraccaroli, 2014). In the context of this study, factor analysis was used to verify the presence of dimensions within the broad conceptual categories of WDIs of the two versions of the WoDDI. More specifically, for the WoDDI-MSD, the WDI categories were "personal," "environmental," and "administrative." For the WoDDI-CMD, the WDI categories were "sociodemographic," "clinical," and "occupational." The "administrative" category did not undergo factor analysis for the WoDDI-CMD because it had only four items.

Several steps were carried out prior to the factor analysis. First, the observed frequencies of each WDI (item) were verified. The researchers established that the phenomenon had to be present for at least 20% of the sample to be integrated into the exploratory factor analyses. Next, for the remaining indicators, the level of multicollinearity between the items was assessed (Furr and Bacharach, 2008). Correlation matrices were generated and only those correlations equal to or greater than 0.30 were retained for the subsequent step. The results on Bartlett's test of sphericity ($p<0.05$) and on the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) (coefficient > 0.60) were taken into consideration in the decisions to include WDIs in the factor analysis. The number of dimensions to be extracted was then determined on the basis of the observation of breaks (the scree test) and on the desired *eigenvalue* of greater than 1.

Lastly, an orthogonal rotation (Varimax) was applied to highlight the dimensions that correlated or not with each other (Furr and Bacharach, 2008). The factor loading matrix of the WDIs was also analyzed in order to determine the dimensions on which these factors were saturated (Furr and Bacharach, 2008).

3.5.2 Internal consistency analysis

Internal consistency assesses the variation obtained between the score on the items and the dimensions emerging from the exploratory factor analysis. It allows the homogeneity of the items in a tool's dimensions to be assessed. It is based on the principle that the items in an instrument are all indicators of a given concept and that a strong relationship exists between them. Cronbach's alpha coefficients were computed for this purpose. This coefficient indicates to what degree the items on a test measure the same construct(s) (Hogan, Stephenson and Parent, 2012). The content of the WDIs having coefficients of 0.9 or more were re-examined, and, if necessary, dropped or modified to eliminate any redundancy. Internal consistency was computed for all the dimensions that emerged from the exploratory factor analyses for both versions of the WoDDI.

3.5.3 Interrater reliability analysis

Interrater reliability assesses the equivalence of the scores obtained on an instrument when it is administered by several different raters. Equivalence is based on the assumption that when measuring the same thing at the same time using the same instrument, different raters should obtain the same result. If this proves not to be the case, it signals an error in measurement possibly attributable to poor definition of the instrument's observation and scoring criteria or to a lack of rater training. As the variables under study were ordinal, Cohen's kappa coefficients were computed on the score of each WDI to measure the level of interrater agreement. Confidence intervals (95%) were also computed for each coefficient. These intervals were interpreted according to the Landis and Koch classification (1977): poor = < 0.00; slight = 0.00-0.20; fair = 0.21-0.40; moderate = 0.1-0.60; substantial = 0.61-0.80; and near perfect = 0.81-1.00.

3.5.4 Convergent validity analysis

Convergent validity is computed to assess whether significant and positive correlations exist with another instrument measuring a related concept. As shown in tables 1 and 2, for both WoDDI versions, Spearman's correlation coefficients were computed between the scores of certain WDIs and the self-report questionnaires. This type of correlation was retained, given that the scales were ordinal. When several WDIs were associated with a particular question on the questionnaire, the mean of the scores for these WDIs was computed before estimating the correlation. If the WDI score for the sample had an appearance frequency equal to or less than 20%, it was removed from the calculation. The mean of the scores for the remaining WDIs was therefore computed.. For the Inventory of Causes of Work Disability Maintenance, Spearman's correlation coefficients were computed only for the WDIs emerging from the EFA.

Table 1. Synthesis of variables and measurement instruments used to assess convergent validity (WoDDI-MSD)

WDI category	Variable	Instrument
P32 – Signs or symptoms of psychological distress	Psychological distress	Psychological Distress Inventory
P31 – Worker's perception that he has a major physical disability[1]	Perception of disability	Roland-Morris/Neck and Upper Limb Index questionnaires
P29 – Presence of kinesiophobia	Kinesiophobia	TAMPA Scale
All the WDIs for MSDs	Causes of work disability maintenance[2]	Inventory of Causes of Work Disability Maintenance

[1] Depending on the main injury site, a different disability questionnaire was used.

[2] The WDIs and corresponding questions are documented in the appendix.

Table 2. Synthesis of variables and measurement instruments used to assess convergent validity (WoDDI-CMD)

WDI category	Variable	Instrument
O8 – Worker's perception that he has a work overload O10 – Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace O11– Worker's perception that he is minimally involved in decision making at work O12 – Worker's perception that he receives little recognition from his organization	Stress at work	Job Content Questionnaire
C4 – Severity of the symptoms related to the CMD	Psychological distress	Psychological Distress Inventory
All the WDIs	Causes of work disability maintenance[1]	Inventory of Causes of Work Disability Maintenance

[1] The WDIs and corresponding questions are documented in the appendix.

3.6 Ethical Considerations

This project was approved by the Comité d'éthique de la recherche en santé chez l'humain (ethics committee for health research involving human subjects) of the Centre hospitalier universitaire de Sherbrooke (CHUS) on February 27, 2014. The free and informed consent of the participants' occupational therapists was obtained in writing. All participants were free to withdraw from the project at any time, without prejudice. All nominal information was anonymized, and the information was kept strictly confidential and accessible only to the research team. The consent forms and the WoDDI records were also stored in a locked filing cabinet, itself in a locked room on the Longueuil campus of Université de Sherbrooke.

4. RESULTS

The results of the study will be presented separately for the two versions of the instrument: first, for the MSD version, and second, for the CMD version. However, the results concerning the raters' and participants' characteristics are reported first.

4.1 Descriptions of Raters' and Participants' Characteristics

4.1.1 Description of raters

A total of 76 raters, employed in either the private sector (n = 55; 72.4%) or the public sector (n = 21; 27.6%), were trained to participate in data collection. Of these, only 35 occupational therapists actually conducted WoDDI interviews with workers, and nine of these used both versions of the WoDDI (MSD and CMD). The breakdown of this subgroup of 35 was similar to that of the whole group, with, respectively, 25 occupational therapists working in the private sector at the time they received the training (71.4%) versus 10 in the public sector (28.6%). For the sake of consistency, in Table 3, the sociodemographic characteristics of the nine occupational therapists are found in both the CMD and MSD data, as they collected data from both populations. Overall, the data revealed that the raters were mainly women between 20 and 29 years of age, and most had a master's level diploma, with an average of four years of experience in work rehabilitation.

Table 3. Sociodemographic characteristics of raters

	CMD N=17[a]		MSD N=27[a]	
	N	%	N	%
Sex				
Female	14	82.4	23	852
Male	3	176	4	148
Age	Mean=29.8 years SD=8.4		Mean=29.0 years SD=7.6	
20-29	11	64.7	18	66.7
30-39	3	17.6	7	26.0
40-49	2	11.8	1	3.7
≥ 50	1	5.9	1	3.7
Highest-level university diploma				
Bachelor's	6	35.3	9	33.3
Master's	11	64.7	18	66.7
Experience in work rehabilitation	Mean=4.2 years SD=6.2		Mean=3.9 years SD=4.5	

a. It should be noted that nine clinicians completed both the WoDDI-CMD and the WoDDI-MSD, which is why the total number is actually greater than 35.

4.1.2 Description of participants

As can be seen from Table 4, the sample was composed of 150 individuals with a CMD. Overall, these workers' characteristics show that they were mostly women and the mean age was 43 years at the time of the evaluation. A large proportion were born in Canada (80%), and of these, 59.3% had a college or university diploma. For 65.4% of the cases, the diagnosis on record was a depressive disorder or trauma- and stress-related disorder. In addition, approximately one-third of the workers reported having had another episode involving a CMD-related work absence at least 12 months prior to undergoing the WoDDI. Lastly, the raters identified another health problem (comorbidity) for approximately half of the sample. The most heavily represented job title was "professional," and the most heavily represented activity sector was "health care and social assistance."

The sex of the 140 workers with an MSD was almost equally divided between female and male. The mean age was 43 years and most of them were born in Canada (74.3%). A total of 63.6% of them had completed elementary or secondary school, and for 84.2%, their pain site was the back, upper extremities, or neck. Also, in 44.3% of the cases, it was not their first episode of work absence for an MSD. Of these workers, 42.1% also reported another health problem (comorbidity). Personal and customer information services (for example, light duty cleaners or patient service associates) and health care and social assistance were respectively the most heavily represented types of occupation and activity sector.

Table 4. Sociodemographic characteristics of participants

	Sample			
	CMD N=150		MSD N=140	
	N	%	N	%
Sex				
Female	94	62.7	64	45.7
Male	56	37.3	76	54.3
Age	Mean=43.3 years SD=9.3		Mean=43.1 years SD=10.8	
20-29	12	8.0	21	15.0
30-39	42	28.0	29	20.7
40-49	52	34.7	46	32.9
≥ 50	44	29.3	44	31.4
Place of birth				
Canada	120	80.0	104	74.3
Abroad	22	14.7	35	25.0
Missing	8	5.3	1	0.7
Level of education completed				
Elementary	13	8.7	28	20.0
Secondary	40	26.7	61	43.6
College	47	31.3	23	16.4
University	42	28.0	17	12.1
Other	1	0.7	9	6.4
Missing	7	4.7	2	1.4
Lives common-law	116	77.3	113	80.7
Lives alone	34	22.7	27	19.3
Has at least one child	100	66.7	104	74.3
Disorders (DSM-V)				
Depressive disorders	61	40.7		
Trauma- and stress-related disorders	37	24.7		
Anxiety disorders	11	7.3		
Depressive and anxiety disorders	17	11.3		
Other disorders	24	16.0		
Site of physical pain				
Back			52	37.1
Upper extremities			35	25.0
Neck and back			31	22.1
Multiple sites			13	9.3
Neck			8	5.7
Lower extremities			1	0.7
Duration of work absence[a]	Mean=8.3 months SD=5.2		Mean=7.6 months SD=4.3	
Work absence history[b]				
CMD	51	34.0		
MSD			62	44.3
Missing	3	2.0	2	1.4
Comorbidity	80	53.3	59	42.1
Type of occupation (NOC, 2016)				
Management	17	11.3	5	3.6
Professional	38	25.3	6	4.3

Technical and paraprofessional	19	12.7	14	10.0
Administration and administrative support	22	14.7	16	11.4
Sales	7	4.7	9	6.4
Personal and customer information services	26	17.4	37	26.4
Industrial, construction and equipment operation trades	6	4.0	14	10.0
Transport and construction workers and labourers	9	6.0	28	20.0
Manufacturing and utilities	6	4.0	11	7.8
Job tenure prior to the work absence	Aver.=11.4 years[c] SD=8.3		Aver.=7.3 years[d] SD=7.8	
Economic activity sector (NAICS, 2017)				
Utilities	3	2.0	0	0.0
Construction	1	0.7	10	7.1
Manufacturing	10	6.7	23	16.4
Wholesale trade	1	0.7	1	0.7
Retail trade	18	12.0	10	7.1
Transportation and warehousing	14	9.3	13	9.3
Information and cultural industries	5	3.3	2	1.4
Finance and insurance	11	7.3	2	1.4
Real estate and rental and leasing	0	0.0	2	1.4
Professional, scientific, and technical services	6	4.0	2	1.4
Administrative and support, waste management and remediation services	7	4.7	13	9.3
Educational services	11	7.3	2	1.4
Health care and social assistance	38	25.3	35	25.0
Arts, entertainment, and recreation	1	0.7	3	2.1
Accommodation and food services	0	0.0	8	5.7
Other services	0	0.0	4	2.9
Public administration	24	16.0	10	7.1

a. This refers to the duration of the work absence at the time when the occupational therapist administered the WoDDI.
b. This piece of data refers to a history of at least one other work absences for the same type of health problem (CMD or MSD) having occurred at least 12 months prior to the start of the current work absence.
c. One piece of data is missing.
d. Two pieces of data are missing.

4.2 WoDDI-MSD

4.2.1 Descriptive data obtained from evaluation of workers

The appearance frequencies of the work disability indicators (WDIs) are presented first for the MSD sample, along with the mean scores and standard deviations obtained on the various self-report questionnaires.

Table 5 shows the distribution of the frequencies for each WDI, for each of the three main categories: “personal,” “administrative,” and “environmental.” The question that the occupational therapist asked himself was: how likely is it that this WDI will contribute to maintaining the work disability? The following ordinal scale was used: 0 = the indicator is not present, 1 = highly unlikely, to 4 = highly likely.

In the MSD sample, five WDIs had cumulative appearance frequencies of 70% or more (total proportion of scores from 1 to 4), suggesting a major presence. These WDIs consisted of three in the “personal” category: P16 – Persistent pain syndrome, P27 – Worker indicates that his current capacities do not meet the requirements of his regular work, and P31 – Worker’s perception that he has a major physical disability. The fourth WDI was in the “administrative” category: A8 – Long-term absence from regular work. The fifth and last WDI was in the “environmental” category: E11 – Worker’s perception that he has to make major efforts in his work to handle heavy loads. All these WDIs ranked among the most frequent.

Table 5. Distribution of WDI frequencies (MSD)

Personal	0	1	2	3	4
P1 Worker's age	71 (50.7%)	27 (19.3%)	18 (12.9%)	16 (11.4%)	8 (5.7%)
P2 Diagnostic label	96 (68.6%)	12 (8.6%)	11 (7.9%)	17 (12.1%)	4 (2.9%)
P3 Ongoing medical investigation/treatment	106 (75.7%)	14 (10.0%)	5 (3.6%)	11 (7.9%)	4 (2.9%)
P4 Worker's perception of an unfinished medical investigation/treatment	107 (76.4%)	3 (2.1%)	11 (7.9%)	12 (8.6%)	7 (5.0%)
P5 Erroneous illness (treatment) representation[a]	98 (70.5%)	4 (2.9%)	14 (10.1%)	17 (12.2%)	6 (4.3%)
P6 Worker has poor knowledge of his condition and recovery prognosis	62 (44.6%)	12 (8.6%)	24 (17.3%)	28 (20.1%)	13 (9.4%)
P7 Perception of a serious injury	58 (41.4%)	9 (6.4%)	19 (13.6%)	38 (27.1%)	16 (11.4%)
P8 Worker's perception of a failed therapy or dissatisfaction with the care received	87 (62.1%)	13 (9.3%)	25 (17.9%)	11 (7.9%)	4 (2.9%)
P9 Presence of a comorbidity (physical or mental)	81 (57.9%)	21 (15.0%)	16 (11.4%)	13 (9.3%)	9 (6.4%)
P10 Presence of physical sequelae resulting from a previous event	115 (82.1%)	8 (5.7%)	12 (8.6%)	5 (3.6%)	0 (0.0%)
P11 Previous medical history (accidental or other)	58 (41.4%)	51 (36.4%)	18 (12.9%)	10 (7.1%)	3 (2.1%)
P12 Worker has a history of one or more long-term work absence(s) for a musculoskeletal problem	105 (75.0%)	17 (12.1%)	8 (5.7%)	6 (4.3%)	4 (2.9%)
P13 Signs or symptoms of a neurological deficit[a]	89 (64.0%)	11 (7.9%)	17 (12.2%)	15 (10.8%)	7 (5.0%)
P14 Syndrome of pain referring to below the knee	116 (82.9%)	2 (1.4%)	12 (8.6%)	7 (5.0%)	3 (2.1%)
P15 Pain management	49 (35.0%)	15 (10.7%)	35 (25.0%)	28 (20.0%)	13 (9.3%)
P16 Persistent pain syndrome	19 (13.6%)	11 (7.9%)	29 (20.7%)	52 (37.1%)	29 (20.7%)
P17 Suspected generalized physical deconditioning[a]	63 (45.3%)	14 (10.1%)	30 (21.6%)	23 (16.5%)	9 (6.5%)
P18 Sedentary lifestyle	99 (70.7%)	14 (10.0%)	15 (10.7%)	10 (7.1%)	2 (1.4%)
P19 Alcohol and/or drug abuse problem	134 (95.7%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	3 (2.1%)
P20 Family obligations	92 (65.7%)	15 (10.7%)	19 (13.6%)	8 (5.7%)	6 (4.3%)
P21 Cultural and/or language barriers	127 (90.7%)	8 (5.7%)	1 (0.7%)	4 (2.9%)	0 (0.0%)
P22 Social isolation	121 (86.4%)	5 (3.6%)	7 (5.0%)	5 (3.6%)	2 (1.4%)
P23 Recent occurrence of one or more significant and major personal events	84 (60.0%)	14 (10.0%)	27 (19.3%)	10 (7.1%)	5 (3.6%)
P24 Worker's perception that his pre-injury family income was inadequate	125 (89.3%)	9 (6.4%)	3 (2.1%)	1 (0.7%)	2 (1.4%)

P25 Worker feels a high level of work dissatisfaction	112 (80.0%)	6 (4.3%)	6 (4.3%)	9 (6.4%)	7 (5.0%)
P26 Worker does not see himself in his regular job[a]	79 (56.8%)	9 (6.5%)	7 (5.0%)	27 (19.4%)	17 (12.2%)
P27 Worker indicates that his current capacities do not meet the requirements of his regular job	3 (2.1%)	7 (5.0%)	30 (21.4%)	61 (43.6%)	39 (27.9%)
P28 Worker is very fearful about returning to work	44 (31.4%)	16 (11.4%)	27 (19.3%)	26 (18.6%)	27 (19.3%)
P29 Presence of kinesiophobia	66 (47.1%)	8 (5.7%)	17 (12.1%)	39 (27.9%)	10 (7.1%)
P30 Presence of catastrophic thinking about pain	87 (62.1%)	6 (4.3%)	18 (12.9%)	23 (16.4%)	6 (4.3%)
P31 Worker's perception that he has a major physical disability	42 (30.0%)	12 (8.6%)	17 (12.1%)	42 (30.0%)	27 (19.3%)
P32 Signs or symptoms of psychological distress	94 (67.1%)	6 (4.3%)	11 (7.9%)	24 (17.1%)	5 (3.6%)
Administrative	**0**	**1**	**2**	**3**	**4**
A1 Prolonged administrative inactivity prior to referral	131 (93.6%)	5 (3.6%)	1 (0.7%)	2 (1.4%)	1 (0.7%)
A2 Presence of functional limitations	129 (92.1%)	6 (4.3%)	2 (1.4%)	1 (0.7%)	2 (1.4%)
A3 Lack of concerted action	124 (88.6%)	2 (1.4%)	4 (2.9%)	8 (5.7%)	2 (1.4%)
A4 One or more failed attempts to return to work (current or past episode)	102 (73.0%)	6 (4.3%)	5 (3.6%)	17 (12.1%)	10 (7.1%)
A5 Potential presence of secondary gains during the work absence	121 (86.4%)	9 (6.4%)	3 (2.1%)	6 (4.3%)	1 (0.7%)
A6 Presence of a legal dispute	108 (77.1%)	5 (3.6%)	14 (10.0%)	9 (6.4%)	4 (2.9%)
A7 No employment/employer on record in the worker's file	136 (97.1%)	1 (0.7%)	1 (0.7%)	1 (0.7%)	1 (0.7%)
A8 Long-term absence from regular work	35 (25.0%)	17 (12.1%)	38 (27.1%)	35 (25.0%)	15 (10.7%)
A9 Long-term absence from any form of work in the company	45 (32.1%)	17 (12.1%)	30 (21.4%)	31 (22.1%)	17 (12.1%)
A10 Recent job tenure at the employer's	120 (85.7%)	5 (3.6%)	8 (5.7%)	3 (2.1%)	4 (2.9%)
A11 Lack of a clearly defined occupational goal	129 (92.1%)	1 (0.7%)	1 (0.7%)	2 (1.4%)	7 (5.0%)
Environmental	**0**	**1**	**2**	**3**	**4**
E1 Worker's perception of inadequate organization of the work	95 (67.9%)	4 (2.9%)	16 (11.4%)	18 (12.9%)	7 (5.0%)
E2 Worker's perception of a high level of occupational stress	89 (63.6%)	8 (5.7%)	19 (13.6%)	14 (10.0%)	10 (7.1%)
E3 Presence of work equipment that the worker regards as inadequate	108 (77.1%)	1 (0.7%)	12 (8.6%)	15 (10.7%)	4 (2.9%)
E4 Presence of a tense atmosphere or interpersonal conflicts at work	99 (70.7%)	13 (9.3%)	10 (7.1%)	11 (7.9%)	7 (5.0%)
E5 Presence of constraining postures	45 (32.1%)	14 (10.0%)	16 (11.4%)	43 (30.7%)	22 (15.7%)
E6 Presence of work activities with repetitive components or involving repetitive tasks	91 (65.0%)	4 (2.9%)	12 (8.6%)	24 (17.1%)	9 (6.4%)
E7 Worker's perception of an inadequate layout of his work station	92 (65.7%)	5 (3.6%)	13 (9.3%)	23 (16.4%)	7 (5.0%)
E8 Worker's perception that he does not have enough recovery	98 (70.0%)	4 (2.9%)	18 (12.9%)	13 (9.3%)	7 (5.0%)

time					
E9 Presence of a prolonged static work posture	77 (55.0%)	10 (7.1%)	18 (12.9%)	24 (17.1%)	11 (7.9%)
E10 Presence of vibration	113 (80.7%)	11 (7.9%)	8 (5.7%)	7 (5.0%)	1 (0.7%)
E11 Worker's perception that he has to make major efforts in his work to handle heavy loads	40 (28.6%)	7 (5.0%)	20 (14.3%)	43 (30.7%)	30 (21.4%)
E12 Worker's perception that he has to make major efforts in his work to handle heavy loads, combined with constraining postures	69 (49.3%)	4 (2.9%)	14 (10.0%)	31 (22.1%)	22 (15.7%)
E13 Presence of prejudice against MSDs in the workplace	122 (87.1%)	3 (2.1%)	7 (5.0%)	7 (5.0%)	1 (0.7%)
E14 Worker's perception that he lacks control over the occurrence of events at work	113 (80.7%)	3 (2.1%)	8 (5.7%)	13 (9.3%)	3 (2.1%)

a. One piece of data is missing.

4.2.2 Self-report questionnaires

Based on the data presented in Table 6, the workers reported having low decision latitude (≤ 72) and high psychological demands (≥ 24). The mean score, which is above 30.95, signals high psychological distress. Regarding the perception of physical disability, the results suggest that the workers perceived themselves as having a major disability. For the workers with an MSD involving the upper extremities, or the upper extremities and the neck (n = 43), while there is no formal cut-off score categorizing the level of disability, the mean score suggests a moderate level of perceived disability. Lastly, the level of kinesiophobia, which reflects the fear of moving and of re-injury, also seems high. The last column indicates the number of questionnaires missing, i.e., not completed, incomplete, or incorrectly completed (for example, more than one answer given when only one answer was required).

Table 6. Mean scores on self-report questionnaires (MSD)

	Mean score	SD	Missing
Job Content Questionnaire – JCQ (n = 137)			3
Items 1 to 9 (decision latitude)	67.43/96	13.97	
Items 10 to 18 (psychological demands)	24.40/36	4.63	
Items 19 to 29 (support at work)	33.55/44	6.11	
Psychological Distress Inventory – PDI (n = 138)	33.14/100	21.43	2
Perception of disability			
Roland-Morris[a](n = 76)	59.10/100	15.99	7
NULI[b](n = 42)	3.89/7	1.21	1
Kinesiophobia – TAMPA (n = 139)	30.62/44	6.52	1

a. This is the mean score of workers whose physical pain site was their back or both their back and neck.
b. This involves workers whose physical injury site was located only in their neck, their neck and upper extremities, or their upper extremities.

4.2.3 Psychometric properties of the WoDDI-MSD

This subsection presents the results obtained regarding the four psychometric properties analyzed during the study: factorial construct validity, internal consistency, interrater reliability, and lastly, convergent validity. It begins by presenting the WDIs that were not examined in certain analyses due to their minimal presence.

WDIs removed

In fact, due to a total proportion of scores ranging from 1 to 4 that was less than 20% ,16 WDIs were not included in the factorial construct validity analyses: 6 in the ”personal” WDI category, 7 in the ”administrative” category, and 3 in the ”environmental” category. These are detailed in Table 7.

Table 7. WDIs removed from factorial construct validity analyses (MSD)

Personal
P10 Presence of physical sequelae resulting from a previous event
P14 Syndrome of pain referring to below the knee
P19 Alcohol and/or drug abuse problem
P21 Cultural and/or language barriers
P22 Social isolation
P24 Worker’s perception that his pre-injury family income was inadequate
Administrative
A1 Prolonged administrative inactivity prior to referral
A2 Presence of functional limitations
A3 Lack of concerted action
A5 Potential presence of secondary gains during the work absence
A7 No employment/employer on record in the worker’s file
A10 Recent job tenure at the employer’s
A11 Lack of a clearly defined occupational goal
Environmental
E10 Presence of vibration
E13 Presence of prejudice against MSDs in the workplace
E14 Worker’s perception that he lacks control over the occurrence of events at work

Factorial construct validity

Only the “personal” and “environmental” categories of indicators (26 and 11 WDIs respectively) underwent exploratory factor analysis (EFA). In fact, once the WDIs with a presence of less than 20% were removed, only four of the 11 WDIs were left in the “administrative” category of WDI, an insufficient number for EFA.

First, 26 “personal” and 11 “environmental” WDIs demonstrated correlation coefficients of 03. and 0.7 respectively, thus meeting acceptable levels of multicollinearity among the WDIs (Furr and Bacharach, 2008). Next, the results of the principal component EFA with Varimax rotation indicated *eigenvalues* between 1.63 and 4.35 for the “personal” WDIs and between 1.17 and 2.33 for the “environmental” WDIs. Lastly, the percentage of cumulative variance explained was 35.2% for the “personal” category (15 statements) and 58% for the “environmental” category (6 statements). The results of the EFA are shown in tables 8 and 9. The saturation index and dimension are shown for each WDI.

Table 8. Exploratory factor analysis of "personal" WDIs (MSD)

	Dimension 1	Dimension 2
P32 Signs or symptoms of psychological distress	0.79	
P29 Presence of kinesiophobia	0.59	
P9 Presence of a comorbidity (physical or mental)	0.58	
P30 Presence of catastrophic thinking about pain	0.54	
P15 Pain management	0.37	
P16 Persistent pain syndrome	0.28	
P6 Worker has poor knowledge of his condition and recovery prognosis		0.67
P2 Diagnostic label		0.61
P31 Worker's perception that he has a major physical disability		0.60
P27 Worker indicates that his current capacities do not meet the requirements of his regular job		0.59
P7 Perception of a serious injury		0.59
P4 Worker's perception of an unfinished medical investigation/treatment		0.57
P3 Ongoing medical investigation/treatment		0.48
P26 Worker does not see himself in his regular job		0.43
P16 Persistent pain syndrome		0.30
Eigenvalues	4.35	1.63
% of variance (cumulative = 35.2%)	20.52	14.7

As can be seen here, the "personal" WDIs fell under two main dimensions. The first dimension explained 20.52% of the variance and included the components of the Fear-Avoidance Model (Vlayen *et al.*,1995). The second dimension explained 14.7% of the variance, and concerned more the person's representations of his illness and disability.

Table 9. Exploratory factor analysis of "environmental" WDIs (MSD)

	Dimension 1	Dimension 2
E12 Worker's perception that he has to make major efforts in his work to handle heavy loads, combined with constraining postures	0.85	
E5 Presence of constraining postures	0.77	
E11 Worker's perception that he has to make major efforts in his work to handle heavy loads	0.71	
E7 Worker's perception of an inadequate layout of his work station	0.49	
E8 Worker's perception that he does not have enough recovery time		0.79
E1 Worker's perception of inadequate organization of the work		0.76
Eigenvalues	2.33	1.17
% of variance (cumulative = 58%)	38.4	19.6

The "environmental" WDIs fell under two dimensions. The first related to the physical requirements of the work, while the second was associated more with the organization of the work, explaining 38.4% and 19.6% of the variance respectively.

Internal consistency

The internal consistency was estimated by WDI category and in light of the results of the factor analysis. All the Cronbach's alpha coefficients were higher than 0.70, suggesting "good" consistency.

Table 10. Cronbach's alpha coefficients, by WDI category and dimension (MSD)

Personal	**Cronbach's alpha**
Dimension: "component of Fear-Avoidance Model"	0.80
Dimension: "disability representation"	0.76
Environmental	
Dimension: "physical requirements of the work"	0.75
Dimension: "organization of the work"	*N/A

*N/A (not applicable): The internal consistency could not be computed when only two WDIs were present.

Interrater reliability

Of the occupational therapists who participated in data collection, six scored three standardized case histories. No occupational therapists dropped out or withdrew. The sociodemographic profile of this sub-group was quite similar to the characteristics of the occupational therapists trained in the WoDDI-MSD (see Table 3). The sub-group consisted of six women, whose average age was 31.7 years. With one exception, they held master's degrees and had 4.9 years of experience in the work rehabilitation field.

As evidenced in Table 11, using the Landis and Koch classification (1977), Cohen's kappa coefficients for the three categories of WDIs showed minimally "acceptable" levels of interrater reliability. Only the kappa coefficient for the "personal" category of WDIs for case history 2 showed somewhat "low" reliability.

Table 11. Cohen's kappa coefficients for the various WDI categories (MSD)

	Case history 1		Case history 2		Case history 3	
Category	**k**	**IC**	**k**	**IC**	**k**	**IC**
Three categories	0.43	0.35-0.50	0.27	0.19-0.35	0.44	0.37-0.51
Personal	0.40	0.30-0.50	0.19	0.09-0.29	0.36	0.27-0.46
Administrative	0.54	0.34-0.73	0.37	0.20-0.54	0.51	0.34-0.67
Environmental	0.24	0.10-0.37	0.23	0.07-0.39	0.50	0.35-0.65

Convergent validity

Table 12 shows the Spearman's coefficients for three WDIs with the total scores on four worker self-report questionnaires. The results suggest statistically significant associations between the WDIs and the measures of back disability (Roland-Morris) and kinesiophobia (TAMPA). However, the association with kinesiophobia was very low and negative. Conversely, there was no statistically significant relationship between the WDIs and the measures of disability in individuals with musculoskeletal disorders involving the neck and upper extremities (NULI) and psychological distress (PDI).

Table 12. Spearman's coefficients between WDIs and workers' self-report questionnaires (MSD)

	R.Morris (n=76)	**NULI** (n=42)	**TAMPA** (n=139)	**PDI** (n=138)
P29 Presence of kinesiophobia			-0.17*	
P31 Worker's perception that he has a major physical disability[a]	0.30*	0.29 (p>0.07)		
P32 Signs or symptoms of psychological distress				-0.01 (p>0.9)

* p<0.05

a. Depending on the main injury site, a different questionnaire on physical disability was used, which explains the lower number of participants.

Similarly, Spearman's correlation coefficients were computed between certain WDIs (see Appendix B) and the results obtained on the Inventory of Causes of Work Disability Maintenance completed by the occupational therapist. Lastly, the Inventory was completed by the occupational therapists for 72 participants, representing a proportion of 51.4% of the overall MSD sample. Table 13 includes only the results for the WDIs retained in the EFAs and the associated questions. These results showed that, with the exception of two questions, the associations were statistically significant (5 out of 7). The questions having no association concerned the impacts of the medical condition and the work context prior to the work absence.

Of the 15 original questions in the Inventory of Causes of Work Disability Maintenance, it was possible to associate eight with the WDIs from the EFAs. Thus, 21 of the 43 WDIs were covered, i.e., 39.6%

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Table 13. Spearman's coefficients between WDIs and Inventory of Causes of Work Disability Maintenance (MSD)

WDI P2 Diagnostic label P4 Worker's perception of an unfinished medical investigation/treatment P5 Erroneous illness (treatment) representation P6 Worker has poor knowledge of his condition and recovery prognosis P7 Perception of a serious injury P26 Worker does not see himself in his regular job P31 Worker's perception that he has a major physical disability ***Inventory of Causes of Work Disability Maintenance*** *10. Estimate the impact of the worker's understanding of his current medical condition*	0.59*
WDI P3 Ongoing medical investigation/treatment P9 Presence of a comorbidity (physical or mental) P32 Signs or symptoms of psychological distress ***Inventory of Causes of Work Disability Maintenance*** *6. Estimate the impact of his current medical condition*	0.10 (p>0.4)
WDI P15 Pain management ***Inventory of Causes of Work Disability Maintenance*** *13. Estimate the impact of the pain management strategies adopted*	0.68**
WDI P16 Persistent pain syndrome ***Inventory of Causes of Work Disability Maintenance*** *15. Estimate the impact of the pain felt*	0.45**
WDI P27 Worker indicates that his current capacities do not meet the requirements of his regular job ***Inventory of Causes of Work Disability Maintenance*** *1. Estimate the impact of the worker's perception of a gap between his current capacities and the requirements of his job*	0.30*

WDI	
P28 Worker is very fearful about returning to work	0.78*
P29 Presence of kinesiophobia	
Inventory of Causes of Work Disability Maintenance	
9. Estimate the impact of the worker's fears of re-injuring himself or aggravating his pain	
WDI	
E1 Worker's perception of inadequate organization of the work	
E7 Worker's perception of an inadequate layout of his work station	0.22 (p>0.07)
Inventory of Causes of Work Disability Maintenance	
5. Estimate the impact of his pre-absence work environment	
WDI	
E5 Presence of constraining postures	
E8 Worker's perception that he does not have enough recovery time	
E11 Worker's perception that he has to make major efforts in his work to handle heavy loads	
E12 Worker's perception that he has to make major efforts in his work to handle heavy loads, combined with constraining postures	0.60**
Inventory of Causes of Work Disability Maintenance	
8. Estimate the impact of the physical risk factors related to his job	

* p<0.05

** p<0.0001

4.3 WoDDI-CMD

The results of this sub-section are presented in the same way as those for the WoDDI-MSD, beginning first with a description of the descriptive data, then followed by the results for the psychometric properties of the WoDDI version developed for workers with a CMD.

4.3.1 Descriptive data obtained from evaluation of workers

First, the appearance frequencies of the WDIs will be reported for the CMD sample, followed by the mean scores and standard deviations obtained on the various self-report questionnaires.

Table 14 shows the frequencies for each WDI. Only two WDIs were present for 70% or more of the sample (total proportion of scores from 1 to 4). These were C4 – Severity of the symptoms related to the CMD, and O16 – Worker's fears about returning to work. However, five WDIs were present in a smaller, but still fairly high proportions of between 50 and 69%. These were S6 – Recent occurrence of one or more significant and major personal events, C10 – Presence of a comorbidity (physical or mental), O8 – Worker's perception that he has a work overload, O10 – Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace, and O12 – Worker's perception that he receives little recognition from his organization.

Table 14. Distribution of WDI frequencies (CMD)

Sociodemographic	**0**	**1**	**2**	**3**	**4**
S1 Worker's age and changes at work[a]	127 (85.2%)	9 (6.0%)	5 (3.4%)	7 (4.7%)	1 (0.7%)
S2 Sex	83 (55.3%)	30 (20.0%)	30 (20.0%)	7 (4.7%)	0 (0.0%)
S3 Family obligations	97 (64.7%)	18 (12.0%)	15 (10.0%)	13 (8.7%)	7 (4.7%)
S4 Cultural and/or language barriers	147 (98.0%)	0 (0.0%)	1 (0.7%)	2 (1.3%)	0 (0.0%)
S5 Social isolation	119 (79.3%)	9 (6.0%)	10 (6.7%)	12 (8.0%)	0 (0.0%)
S6 Recent occurrence of one or more significant and major personal events	61 (40.7%)	23 (15.3%)	30 (20.0%)	22 (14.7%)	14 (9.3%)
Clinical	**0**	**1**	**2**	**3**	**4**
C1 Duration of the work absence	113 (75.3%)	15 (10.0%)	7 (4.7%)	11 (7.3%)	4 (2.7%)
C2 Worker's negative perception of his recovery time	94 (62.7%)	11 (7.3%)	15 (10.0%)	24 (16.0%)	6 (4.0%)
C3 Worker is worried about the seriousness of the consequences of his CMD	106 (70.7%)	13 (8.7%)	12 (8.0%)	13 (8.7%)	6 (4.0%)
C4 Severity of the symptoms related to the CMD	32 (21.3%)	12 (8.0%)	23 (15.3%)	50 (33.3%)	33 (22.0%)
C5 Worker has difficulty accepting the fact that he is off work for a CMD	110 (73.3%)	13 (8.7%)	16 (10.7%)	9 (6.0%)	2 (1.3%)
C6 Worker makes risky use of his medication	145 (96.7%)	1 (0.7%)	2 (1.3%)	2 (1.3%)	0 (0.0%)
C7 Drug treatment regimen has changed several times	105 (70.0%)	13 (8.7%)	15 (10.0%)	11 (7.3%)	6 (4.0%)
C8 Lack of treatment for depression for more than six months since stopping work	146 (97.3%)	3 (2.0%)	0 (0.0%)	0 (0.0%)	1 (0.7%)
C9 Presence in the worker of indications or signs of a work-related post-traumatic stress disorder	139 (92.7%)	1 (0.7%)	3 (2.0%)	3 (2.0%)	4 (2.7%)
C10 Presence of a comorbidity (physical or mental)	69 (46.0%)	25 (16.7%)	26 (17.3%)	21 (14.0%)	9 (6.0%)
C11 Many work absences in the past two years (for three months or longer and for various reasons other than a CMD)	144 (96.0%)	1 (0.7%)	3 (2.0%)	2 (1.3%)	0 (0.0%)
C12 Worker has a history of one or more long-term work absences for a CMD	102 (68.0%)	18 (12.0%)	21 (14.0%)	9 (6.0%)	0 (0.0%)
C13 Alcohol and/or drug abuse	119 (79.3%)	14 (9.3%)	9 (6.0%)	7 (4.7%)	1 (0.7%)
C14 Worker's lack of confidence in the intervention offered to him	143 (95.3%)	4 (2.7%)	1 (0.7%)	2 (1.3%)	0 (0.0%)

Administrative	**0**	**1**	**2**	**3**	**4**
A1 Presence of secondary gains during the work absence	130 (86.7%)	5 (3.3%)	5 (3.3%)	10 (6.7%)	0 (0.0%)
A2 Little insurance coverage	125 (83.3%)	10 (6.7%)	6 (4.0%)	5 (3.3%)	4 (2.7%)
A3 Exclusion clauses due to previous CMD history	150 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
A4 Presence of a legal dispute	139 (92.7%)	7 (4.7%)	1 (0.7%)	3 (2.0%)	0 (0.0%)
Occupational	**0**	**1**	**2**	**3**	**4**
O1 One or more failed attempts to return to work (current or past episode)	133 (88.7%)	5 (3.3%)	7 (4.7%)	4 (2.7%)	1 (0.7%)
O2 Worker's perception that his family or friends are pressuring him to return to work	124 (82.7%)	17 (11.3%)	9 (6.0%)	0 (0.0%)	0 (0.0%)
O3 No employment/employer on record in the worker's file	149 (99.3%)	0 (0.0%)	0 (0.0%)	1 (0.7%)	0 (0.0%)
O4 Worker holds a senior management position	132 (88.0%)	4 (2.7%)	3 (2.0%)	9 (6.0%)	2 (1.3%)
O5 Threats or rumours of layoffs in the worker's organization prior to or during his work absence	124 (82.7%)	10 (6.7%)	8 (5.3%)	5 (3.3%)	3 (2.0%)
O6 Job cuts and/or staff reductions during his work absence	125 (83.3%)	14 (9.3%)	3 (2.0%)	6 (4.0%)	2 (1.3%)
O7 Precarious nature of the worker's job	146 (97.3%)	2 (1.3%)	0 (0.0%)	1 (0.7%)	1 (0.7%)
O8 Worker's perception that he has a work overload	64 (42.7%)	7 (4.7%)	16 (10.7%)	32 (21.3%)	31 (20.7%)
O9 Presence of competitive atmosphere and high performance and/or productivity requirements in the worker's workplace	78 (52.0%)	12 (8.0%)	19 (12.7%)	28 (18.7%)	13 (8.7%)
O10 Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace	75 (50.0%)	9 (6.0%)	14 (9.3%)	21 (14.0%)	31 (20.7%)
O11 Worker's perception that he is minimally involved in decision making at work	90 (60.0%)	25 (16.7%)	24 (16.0%)	7 (4.7%)	4 (2.7%)
O12 Worker's perception that he receives little recognition from his organization	72 (48.0%)	27 (18.0%)	29 (19.3%)	15 (10.0%)	7 (4.7%)
O13 Worker feels a high level of work dissatisfaction:	91 (60.7%)	9 (6.0%)	18 (12.0%)	22 (14.7%)	10 (6.7%)
O14 Major or fast changes have taken place in the worker's organization	103 (68.7%)	14 (9.3%)	16 (10.7%)	14 (9.3%)	3 (2.0%)
O15 Fears stemming from the negative atmosphere and events that occurred right before the worker stopped work	83 (55.3%)	7 (4.7%)	18 (12.0%)	20 (13.3%)	22 (14.7%)
O16 Worker's fears about returning to work	10 (6.7%)	7 (4.7%)	16 (10.7%)	63 (42.0%)	54 (36.0%)
O17 Few accommodations possible in the job the worker is expected to return to [b]	113 (76.4%)	7 (4.7%)	11 (7.4%)	14 (9.5%)	3 (2.0%)
O18 Impact of the gradual return to work on coworkers' workloads	144 (96.0%)	4 (2.7%)	2 (1.3%)	0 (0.0%)	0 (0.0%)

O19 Presence of prejudice against CMDs in the workplace	125 (83.3%)	7 (4.7%)	10 (6.7%)	8 (5.3%)	0 (0.0%)
O20 Worker's perception that he lacks control over the occurrence of events at work[a]	101 (67.8%)	7 (4.7%)	9 (6.0%)	23 (15.4%)	9 (6.0%)
O21 Lack of regular communication between the employer and worker	96 (64.0%)	22 (14.7%)	18 (12.0%)	11 (7.3%)	3 (2.0%)
O22 Worker's perception that the workplace is pressuring him to return to work	139 (92.7%)	3 (2.0%)	6 (4.0%)	2 (1.3%)	0 (0.0%)
O23 Worker's perception that the insurer is pressuring him to return to work	120 (80.0%)	9 (6.0%)	15 (10.0%)	3 (2.0%)	3 (2.0%)
O24 Worker's perception that the physician is pressuring him to return to work	132 (88.0%)	8 (5.3%)	7 (4.7%)	2 (1.3%)	1 (0.7%)

a. One piece of data is missing.
b. Two pieces of data are missing.

4.3.2 Self-report questionnaires

For the CMD component, only two self-report questionnaires were completed by the participants at the end of the WoDDI. The results shown in Table 15 for the JCQ suggest low decision latitude (≤ 72) and high psychological demand (≥ 24) at work. Moreover, the results on the "support at work" subscale suggest the presence of moderate support from coworkers and the supervisor, as the maximum score obtained was 44. The mean score on the Psychological Distress Inventory (PDI) suggests a very high level of psychological distress (≥ 30.95). The last column indicates the number of questionnaires missing, i.e., not completed, incomplete, or improperly completed (for example, more than one answer given when only one was required).

Table 15. Mean scores on self-report questionnaires (CMD)

	Mean score	SD	Missing
Job Content Questionnaire – JCQ (n=149)			1
Items 1 to 9 (decision latitude)	67.85/96	11.39	
Items 10 to 18 (psychological demands)	26.70/36	4.34	
Items 19 to 29 (support at work)	29.55/44	6.00	
Psychological Distress Inventory – PDI (n=148)	53.83/100	20.79	2

4.3.3 Psychometric properties of the WoDDI-CMD

The results illustrate the factorial construct validity, internal consistency, interrater reliability, and lastly, convergent validity of this instrument. Reported first are the WDIs not considered in certain analyses due to their minimal presence.

WDIs removed

Given their minimal presence (total proportion of scores ranging from 1 to 4 was less than 20%), 22 WDIs were not included in the factorial construct validity analyses: 2 in the "sociodemographic" category, 5 "clinical," 4 "administrative," and 11 "occupational." These WDIs are detailed in Table 16.

Table 16. WDIs removed from factorial construct validity analyses (CMD)

Sociodemographic
S1 Worker's age and changes at work
S4 Cultural and/or language barriers
Clinical
C6 Worker makes risky use of his medication
C8 Lack of treatment for depression for more than six months since stopping work
C9 Presence in the worker of indications or signs of a work-related post-traumatic stress disorder
C11 Many work absences in the past two years (for three months or longer and for various reasons other than a CMD)
C14 Worker's lack of confidence in the intervention offered to him
Administrative
A1 Presence of secondary gains during the work absence
A2 Little insurance coverage
A3 Exclusion clauses due to previous CMD history
A4 Presence of a legal dispute
Occupational
O1 One or more failed attempts to return to work (current or past episode)
O2 Worker's perception that his family or friends are pressuring him to return to work
O3 No employment/employer on record in the worker's file
O4 Worker holds a senior management position
O5 Threats or rumours of layoffs in the worker's organization prior to or during his work absence
O6 Job cuts and/or staff reductions during his work absence
O7 Precarious nature of the worker's job
O18 Impact of the gradual return to work on coworkers' workloads
O19 Presence of prejudice against CMDs in the workplace
O22 Worker's perception that the workplace is pressuring him to return to work
O24 Worker's perception that the physician is pressuring him to return to work

Construct validity: exploratory factor analysis

Due to the removal of certain WDIs (the "sociodemographic" and "administrative" categories were eliminated due to an insufficient number of WDIs), the exploratory factor analysis (EFA) was carried out only for the "clinical" and "occupational" WDIs. The criteria applied were the same as those described in sub-section 4.2.3 for the WoDDI-MSD version. The results of the principal component EFA with Varimax rotation yielded *eigenvalues* between 1.29 and 1.85 for the "clinical" WDIs and between 1.85 and 2.26 for the "occupational" WDIs. The percentage of cumulative variance explained was 39.2% for the "clinical" WDIs (8 statements) and 42.7% for the "occupational" WDIs (10 statements). The results of the EFA are presented in tables 17 and 18.

Table 17. Exploratory factor analysis of "clinical" WDIs (CMD)

	Dimension 1	Dimension 2
C3 Worker is worried about the seriousness of the consequences of his CMD	0.77	
C2 Worker's negative perception of his recovery time	0.66	
C5 Worker has difficulty accepting the fact that he is off work for a CMD	0.46	
C4 Severity of the symptoms related to the CMD	0.46	
C12 Worker has a history of one or more long-term work absences for a CMD	0.43	
C7 Drug treatment regimen has changed several times		0.73
C10 Presence of a comorbidity (physical or mental)		0.71
C1 Duration of the work absence		0.53
Eigenvalues	1.85	1.29
% of variance (cumulative = 39.2%)	23.1	16.1

The "clinical" WDIs fell under two main dimensions. The first dimension explained 23.1% of the variance and concerned illness representations and the manifestation of symptoms. The concept of representation was discussed earlier in the section on the WoDDI-MSD. The second factor, which explained 16.1% of the variance, concerned the clinical judgment of the seriousness of the medical condition.

Table 18. Exploratory factor analysis of "occupational" WDIs (CMD)

	Dimension 1	Dimension 2
O10 Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace	0.75	
O15 Fears stemming from the negative atmosphere and events that occurred right before the worker stopped work	0.71	
O12 Worker's perception that he receives little recognition from his organization	0.67	
O13 Worker feels a high level of work dissatisfaction	0.64	
O11 Worker's perception that he is minimally involved in decision making at work	0.57	
O21 Lack of regular communication between the employer and worker	0.45	
O9 Presence of competitive atmosphere and high performance and/or productivity requirements in the worker's workplace		0.71
O8 Worker's perception that he has a work overload		0.58
O14 Major or fast changes have taken place in the worker's organization		0.44
O23 Worker's perception that the insurer is pressuring him to return to work		0.43
Eigenvalues	2.26	1.85
% of variance (cumulative = 42.7%)	25.7	17.0

The "occupational" WDIs fell under two main dimensions. The first dimension, explaining 25.7% of the variance, includes relations with the workplace and the employer. The second dimension, which explains 17% of the variance, concerns job performance requirements.

Internal consistency

The internal consistency was estimated by WDI category and in light of the results of the factor analysis. Table 19 shows Cronbach's alpha coefficients ranging from 0.40 to 0.75.

Table 19. Cronbach's alpha coefficients, by WDI category and dimension (CMD)

Dimension by category	Cronbach's alpha
Clinical	
Dimension: "representation of the illness and its symptoms"	0.50
Dimension: "clinical judgment of the seriousness of the medical condition"	0.40
Occupational	
Dimension: "relations with the workplace and the employer"	0.75
Dimension: "job performance requirements"	0.45

Given two weak Cronbach's alpha coefficients for each of the dimensions in the "clinical' category, a complementary analysis was carried out. A Cronbach's alpha coefficient was estimated using all the "clinical" WDIs retained in the factor analysis. The value obtained was 0.51, which was no higher than the results presented.

Interrater reliability

Six of the occupational therapists who participated in data collection scored three standardized case histories. None of these therapists withdrew. The sociodemographic profile of this sub-group was quite similar to that of the occupational therapists trained for the CMD component (see Table 3). They consisted of six women whose mean age was 27.7 years. With one exception, they all had a master's degree. However, they averaged only 1.1 years of experience in the field of work rehabilitation, which is substantially lower than the overall average of 4.2 years. The six occupational therapists had nonetheless each conducted an average of 13.2 WoDDI-CMD interviews (range of 6 to 23) during the course of the study, i.e., more than double the required minimum for participating in this phase (see sub-section 3.4).

Cohen's kappa coefficients, based on Landis and Koch's classification (1977), suggested moderate levels of agreement overall, both for all the WDIs and for all the categories, with the exception of the "administrative" WDIs for case history 3, for which the levels of agreement could be described as "acceptable".

Table 20. Cohen's kappa coefficients for the various WDI categories (CMD)

Category	Case history 1		Case history 2		Case history 3	
	k	CI	k	CI	k	CI
Four categories	0.57	0.50-0.65	0.56	0.48-0.64	0.51	0.43-0.58
Sociodemographic	0.54	0.32-0.77	0.63	0.42-0.83	0.53	0.31-0.76
Clinical	0.48	0.33-0.62	0.58	0.44-0.72	0.58	0.44-0.71
Administrative	0.58	0.28-0.88	0.51	0.21-0.81	0.33	0.13-0.54
Organizational	0.61	0.51-0.72	0.53	0.42-0.64	0.42	0.31-0.54

Convergent validity

Table 21 shows the convergent validity between five WDIs and the results of two self-report questionnaires completed by the participants. All the Spearman's coefficients were statistically significant at $p<0.05$, except for the correlation between the "severity of the symptoms" WDI (C4) and the score on the Psychological Distress Index.

Table 21. Spearman's coefficients between WDIs and workers' self-report questionnaires (CMD)

	JCQ (10-18) (n=149)	**JCQ (19-24)** (n=149)	**JCQ (25-29)** (n=149)	**PDI** (n=148)
C4 Severity of the symptoms related to the CMD				0,15 ($p>0.07$)
O8 Worker's perception that he has a work overload	0.58**			
O10 Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace		-0.39*		
O11/O12 Worker's perception that he is minimally involved in decision making at work and that he receives little recognition from his organization			-0.53**	

* $p<0.05$
** $p<0.0001$

Spearman's correlation coefficients were also computed between certain WDIs (see Appendix B) and the results obtained on the Inventory of Causes of Work Disability Maintenance, completed by the occupational therapist. For this population, the questionnaire was completed by 65 participants, representing 43.3% of the sample. Table 22 includes only the results for the WDIs retained in the EFAs and the related questions. These results showed that, with one exception, all the correlations were statistically significant. Of the 19 original questions in the Inventory of Causes of Work Disability Maintenance, 11 were found to correlate with the WDIs from the EFAs. Hence 17 of the 39 WDIs were covered, or a proportion of 43.6%

Table 22. Spearman's coefficients between WDIs and Inventory of Causes of Work Disability Maintenance (CMD)

WDI C1 Duration of the work absence	0.46**
Inventory of Causes of Work Disability Maintenance *15. Estimate the impact of the duration of the current work absence episode*	
WDI C2 Worker's negative perception of his recovery time C3 Worker is worried about the seriousness of the consequences of his CMD C5 Worker has difficulty accepting the fact that he is off work for a CMD	0.38*
Inventory of Causes of Work Disability Maintenance *9. Estimate the impact of the worker's understanding of his current medical condition*	
WDI C4 Severity of the symptoms related to the CMD C7 Drug treatment regimen has changed several times C10 Presence of a comorbidity (physical or mental)	0.63**
Inventory of Causes of Work Disability Maintenance *5. Estimate the impact of his current medical condition*	
WDI C12 Worker has a history of one or more long-term work absences for a CMD	0.78**
Inventory of Causes of Work Disability Maintenance *10. Estimate the impact of one or more previous work absence episodes for a mental health problem*	
WDI O8 Worker's perception that he has a work overload	0.86**
Inventory of Causes of Work Disability Maintenance *19. Estimate the impact of the worker's perception that he has a work overload*	

WDI O9 Presence of competitive atmosphere and high performance and/or productivity requirements in the worker's workplace O10 Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace O11 Worker's perception that he is minimally involved in decision making at work O12 Worker's perception that he receives little recognition from his organization ***Inventory of Causes of Work Disability Maintenance*** *4. Estimate the impact of his pre-absence work environment*	0.55*
WDI O13 Worker feels a high level of work dissatisfaction: ***Inventory of Causes of Work Disability Maintenance*** *8. Estimate the impact of the worker's job dissatisfaction before the work absence*	0.77**
WDI O14 Major or fast changes have taken place in the worker's organization ***Inventory of Causes of Work Disability Maintenance*** *16. Estimate the impact of major and fast changes made in the organization by the employer*	0.78*
WDI O15 Fears stemming from the negative atmosphere and events that occurred right before the worker stopped work ***Inventory of Causes of Work Disability Maintenance*** *14. Estimate the impact of the worker's fears about returning to work*	-0.19 (p>0.882)
WDI O21 Lack of regular communication between the employer and worker ***Inventory of Causes of Work Disability Maintenance*** *2. Estimate the impact of the absence or lack of communication between the absent worker and his employer*	0.58*
WDI O23 Worker's perception that the insurer is pressuring him to return to work ***Inventory of Causes of Work Disability Maintenance*** 7. Estimate the impact of the social pressure exerted by one or more people to speed up the return to work	0.43*

5. DISCUSSION

The main objective of this study was to evaluate four psychometric properties of the two versions of the WoDDI (MSD and CMD), namely, factorial construct validity, internal consistency, interrater reliability, and convergent validity.

The main results led to four major findings. First, before a definitive version of the instrument is put forward, certain WDIs require further study in populations having the same health problems, but more diversified characteristics and contexts. The results of the EFAs revealed similar dimensions in both versions, dimensions that are supported in the recent scientific literature. This finding partly supports the instrument's construct validity. However, the weak results for the internal consistency of certain dimensions raise a few reservations, particularly regarding the WoDDi-CMD version. Interrater reliability was satisfactory as to the nature of the instrument (structured interview), but still leaves room for improvement. Lastly, given that no standard measure exists, its convergent validity has yet to be confirmed. These findings are all discussed below.

5.1 Factorial Construct Validity

For the MSD sample, a total of 16 of the 57 WDIs, or roughly one third (28%), were not included in the EFA. For the CMD sample, 22 of the 48 WDIs were not included, representing nearly one half (46%). These WDIs were removed on the basis of the following criterion: only WDIs present in more than 20% of the sample were retained for the factor analyses. Close observation of the WDIs that could not be included in the analyses of the two versions of the WoDDI also revealed that most of them came from groups of experts, not from the scientific literature review. Two sources were in fact used to develop the WDIs: (1) a literature review in which the results regarding the influence of the WDIs had to be convergent across three or more scientific studies, and (2) a consensus of experts in the field. In light of our study results, it appears that the studies on WDIs drawn from groups of experts require further exploration, with a particular focus on more diversified populations such as individuals receiving no income replacement indemnities, coming from various ethnocultural origins, or holding senior management positions. That being said, the results clearly reflect the clientele treated mainly by occupational therapists working in the private work rehabilitation sector. Lastly, the duration of the clinical trials of the WoDDI may also help explain the removal of more WDIs from the CMD version. In fact, as mentioned earlier, the MSD version has been tried out for over a decade by a university clinical team with 500 patients (Loisel *et al.*,1997; Rivard *et al.*, 2011) and has undergone numerous revisions. Regarding the WoDDI-CMD used in our study, it has been tried out with only around 40 patients. In summary, a complementary study should be conducted before removing the WDIs that were found to be minimally present in our sample.

5.2 Internal Consistency

The exploratory factor analyses (EFAs) brought to light conceptual dimensions related to constructs, thus allowing us to estimate the validity of the factorial constructs. Three dimensions were similar in both versions of the WoDDI.

A first common dimension pertained to illness representations. Representations are defined as an organized set of information, opinions, attitudes, and beliefs about a given subject, in this case, illness, and disability (Abric, 2003). Representations in turn influence a person's behaviours (Hoving *et al.*, 2010). The presence of this dimension is consistent with all the prior work done by our study's research team, which underscores the importance – in work rehabilitation – of evaluating illness representations and taking them into account. The latter constitute a driver for the actions of individuals in work disability situations (Coutu *et al.*, 2010); based on their representations, these individuals adopt behaviours that are conducive or not to their health and to reducing their disability (Hoving *et al.*, 2010; Maillette, Coutu, Gaudreault, 2017). From a theoretical standpoint, the importance of this dimension comes as no surprise. In fact, workers develop representations based not only on their own experiences, but also on experiences in a broader sense. For example, if workers perceive a negative relationship with their workplace and high work demands, this will colour how they evaluate their capacities. Representations are thus a concept both arising from the individual and shaped by his interaction with his environment. The importance of this dimension is confirmed by the synthesis of systematic reviews produced by Wagner *et al.* (2014). These authors, who retained the factors affecting more than one health problem, postulated that several components of people's illness representations – including a negative perception of disability and health and low recovery expectations – are strongly associated with work disability. They qualified this association as "strong" evidence, according to AMSTAR quality assessment criteria (Shea *et al.*, 2007). Similarly, the systematic review conducted by Laisné *et al.* (2012) on the prediction-of-prognosis factors for the work participation of individuals with an MSD, showed that recovery expectations also represent "strong" evidence. Lastly, in a randomized trial involving individuals with a CMD, the same "recovery expectation" factor was identified as a predictor for obtention of an income replacement indemnity, and thus for non-participation in work (Løvvik, Shaw, Øverland and Reme, 2014).

The second dimension that was similar in both WoDDI versions pertained to the health professional's clinical judgment of the seriousness of the medical condition. It appears that occupational therapists themselves form a representation of the illness of the person they are treating, and that this representation becomes the theory underlying how they shape the intervention program. A number of authors stress the importance of properly personalizing rehabilitation programs, as they will then do a better job of meeting the workers' needs and promoting the RTW (Marois and Durand, 2009; Main and Shaw, 2016). However, all this depends on a proper, evidence-based assessment of the individuals involved. As has been stated, an erroneous representation of the situation will result in behaviours that are highly unlikely to foster rehabilitation, for both the worker who is off work and the clinician (Coutu *et al.*, 2010; Maillette *et al.*, 2017). The advantage of the WoDDI is precisely that it "forces" the observation of indicators taken from documented sources, in a "dialogue" format involving the persons concerned. This format provides additional information that surpasses the results of self-report questionnaires when they are used without feedback with the respondents. Moreover, the synthesis of systematic reviews by White *et al.* (2015) found that the presence of

a complex medical condition, poor health, fatigue, pain, distress, or depressive symptoms appears to be strongly associated with work disability among individuals with a variety of health problems, including an MSD. And the systematic reviews by Laisné *et al.* (2012) and Lee *et al.* (2015) both recognize psychological distress in people with an MSD as a strong predictor of work disability. All this justifies including this dimension in the assessment of the work disability situation.

Lastly, the third similar dimension pertained to the high levels of job demands. This dimension can be associated with the classic job demand-latitude model developed by Karasek (1979) and that has widely influenced research on the impact of psychosocial factors on workers' health. More specifically, this model depicts an interaction between the perception of job demands, control exerted, and workers' health. The perception of job demands includes the physical and psychological constraints of the work, such as the quantitative and qualitative workloads. Regarding control, it consists of the person's autonomy in terms of applying his or her knowledge and skills, the latitude allowed for decision making, and his authority. Clearly, a heavy workload combined with a fast work pace and limited control over demands represents a risk of the worker developing a physical or psychological health problem. A number of systematic reviews or meta-analyses confirm this model, such as those by Da Costa and Vieira (2010) and by Bernal *et al.* (2015) for MSDs, and those by Lang *et al.* (2012) and Stansfeld *et al.* (2006) for CMDs. Moreover, the results obtained from the Job Content Questionnaire (JCQ) for both samples attest clearly to the presence of the components of Karasek's model. The high physical demands associated with MSDs are also described in the literature on occupational risk factors (Dick *et al.*, 2017; Da Costa and Vieira, 2010; Sterud and Tynes, 2013). This third dimension thus appears essential for these populations.

Two other dimensions emerged more specifically from the WoDDI-MSD version. The first comprised components of the fear-avoidance model developed by Vlaeyen *et al.* (1995). This dimension is described extensively in the literature (Dionne *et al.*, 2007; Leeuw *et al.*, 2007; Vlaeyen and Linton, 2012; Corbière *et al.*, 2011; Coutu, Baril, Durand, Côté and Rouleau, 2007). In short, this model describes how, when pain and negative judgments are present, catastrophizing thoughts can generate a fear of pain, and even increase the pain, in a person. A vicious circle can then ensue, in which the fear generates avoidance behaviours. The more frequently that people adopt these behaviours, the more likely they are to disengage from their activities, which in turn affects their mood. Thus, while at the beginning of an MSD, activity avoidance is a healthy behaviour to allow tissues to heal, when it persists, this avoidance will be transposed to work activities. In the sample examined in this study, where the workers had been off work for at least three months, these fears may thus have been very high and constituted a hindrance to the RTW. This dimension therefore appears highly pertinent for this population.

The second dimension for the WoDDI-MSD version concerned the organization of work and included only two statements. The organization of work has a conventional definition in the WoDDI, i.e., it refers primarily to the distribution of tasks (which includes establishing the order of performance), control of time, and organization of production methods and techniques (Simard, 2002). Poor work organization can thus cause a physical overload (e.g., too fast a work pace that precludes sufficient rest and recovery time, or the performance of certain tasks that could have been avoided if equipment or additional human resources were present). This represents a risk factor for the development of an MSD that is also described at length in the literature (Dick et al, 2017). It is therefore important that this dimension also be evaluated in a

work rehabilitation context. In fact, health professionals (in Québec, often occupational therapists) plan gradual returns to work, and are obliged to take the risks present in the work environment into account in order to prevent aggravation or re-injury.

For the WoDDI-CMD version, only one other dimension emerged. It pertained to the workers' relationship with their workplace and employer, referring solely to interpersonal relations. Social support at work has long been studied as an important condition for health, as, for example, by Johnson and Hall (1988), in Stansfeld and Candy's meta-analysis (2006), and more recently in the systematic review by Lang *et al.* (2012). All the results converge to suggest that low social support at work is a risk factor for the development of a CMD. A more recent longitudinal study of 1,000 individuals with a CMD obtained the same finding: that the social environment at work (relationship with coworkers, work conflicts, and feelings of isolation) was closely related to participation in work (Olsen *et al.*, 2015). In our study sample, the participants with a CMD reported receiving moderate social support, while the workers with an MSD perceived receiving greater social support.

Based on the results of the EFAs, the dimensions present fell into three of the four systems depicted in the work disability paradigm, namely, the personal (coping) system of the absent worker, the health care system (occupational therapist's judgment) and the workplace system. These dimensions all find strong theoretical support in the current literature that justifies their pertinence. Furthermore, the few WDIs concerning the insurance system were not included in the analyses due to their minimal presence. It is probable, however, that our study sample corresponded to a sub-group of individuals with MSDs or CMDs, as the vast majority of the 290 participants in our study were receiving disability compensation from the CNESST or from private insurers, had a contractual relationship at the time when the WoDDI was administered, and were enrolled in a work rehabilitation program. The participants had already gone through several steps, including having had their health problem recognized as eligible for compensation, a first series of treatments, and referral to a work rehabilitation program. The characteristics of our study sample also corresponded closely to those of workers compensated by the CNESST or by private insurers. In short, for 2015, the CNESST reported a proportion of 57.2% men and 42.8% women as being compensated for an MSD, and our results reveal respective proportions of 54.3% and 45.7%. Moreover, for 60% of our MSD sample, the workers were over 40 years of age, whereas, again for 2015, the CNESST reported a proportion of 54% of workers in this same age group. Lastly, the injury sites were also comparable, with the back and upper extremities predominating (CNESST, 2016). Regarding our CMD sample, the results also converged with those obtained in other studies of workers absent from work and receiving compensation for a CMD. The profile that emerged was, among other things, predominantly of women over 40 years of age, a large proportion of whom had diagnoses of depression and stress-related disorders (Roelen *et al.*, 2012). In summary, while the WDIs associated with the insurance system were not very present in our sample, they should not be excluded. In fact, as mentioned earlier, our study samples represented people with an already-established tie to insurance companies and a rehabilitation process already under way. Moreover, Kilgour *et al.* (2015) strongly emphasized the many influences of the insurance system on the rehabilitation process.

The use of EFAs also clearly helps reduce the number of items in an instrument. In this study, the results of the analyses suggest that the WDIs for both the "personal" and "environmental" categories of the WoDDI-MSD version should be reduced by approximately 38% (from 37 WDIs

to 23), and the “clinical” and “occupational” categories of the WoDDI-CMD version by 18% (from 22 WDIs to 18). However, this does not take into account the fact that certain factors were removed from the analyses due to their minimal presence. The results must also be examined in light of the estimated internal consistency of the dimensions. There is, in fact, a marked contrast between the internal consistency results for the two versions of the instrument. While consistency was good for the WoDDI-MSD, for the WoDDI-CMD, three of the four dimensions that emerged appeared to have somewhat poor internal consistency, suggesting little between-item homogeneity in this version of the instrument and a lack of precision in the measure. Given the results obtained for the WoDDI-CMD, it would therefore not be recommended to use these dimensions as subscales. That being said, Cronbach’s alpha is a rather conservative reliability coefficient (Laveault and Grégoire, 2014; Hogan *et al.*, 2012). In fact, this method is based on the premise that each item on an instrument is comparable to the others, i.e., that they all have the same variance and level of difficulty, when in reality, this is rarely the case. This results in an underestimation of the reliability of the total score on the instrument. Seen from this perspective, it is important to remember that the WoDDI seeks to measure complex concepts, specifically, the causes of work disability, a fact that could partly explain these results. The contrasting results obtained for the two versions of the instrument attest once again to a greater advancement in knowledge of MSDs than of CMDs. The aim of a subsequent study could therefore be to improve the WoDDI-CMD version by adding items to the dimensions that emerged in our study and continuing to study its psychometric properties.

Regarding the results obtained, tables 23 and 24 show the WDIs to be retained and those warranting further exploration in future studies of more diversified populations.

Table 23. WoDDI-MSD content to retain and content to explore further

"Personal" WDIs to retain
P2 Diagnostic label
P3 Ongoing medical investigation/treatment
P4 Worker's perception of an unfinished medical investigation/treatment
P6 Worker has poor knowledge of his condition and recovery prognosis
P7 Perception of a serious injury
P9 Presence of a comorbidity (physical or mental)
P15 Pain management
P16 Persistent pain syndrome
P26 Worker does not see himself in his regular job
P27 Worker indicates that his current capacities do not meet the requirements of his regular job
P28 Worker is very fearful about returning to work
P29 Presence of kinesiophobia
P30 Presence of catastrophic thinking about pain
P31 Worker's perception that he has a major physical disability
P32 Signs or symptoms of psychological distress
"Personal" WDIs to explore further
P10 Presence of physical sequelae resulting from a previous event
P14 Syndrome of pain referring to below the knee
P19 Alcohol and/or drug abuse problem
P21 Cultural and/or language barriers
P22 Social isolation
P24 Worker's perception that his pre-injury family income was inadequate
"Administrative" WDIs to explore further
A1 Prolonged administrative inactivity prior to referral
A2 Presence of functional limitations
A3 Lack of concerted action
A4 One or more failed attempts to return to work (current or past episode)
A5 Potential presence of secondary gains during the work absence
A6 Presence of a legal dispute
A7 No employment/employer on record in the worker's file
A8 Long-term absence from regular work
A9 Long-term absence from any form of work in the company
A10 Recent job tenure at the employer's
A11 Lack of a clearly defined occupational goal
"Environmental" WDIs to retain
E1 Worker's perception of inadequate organization of the work
E5 Presence of constraining postures
E7 Worker's perception of an inadequate layout of his work station
E8 Worker's perception that he does not have enough recovery time
E11 Worker's perception that he has to make major efforts in his work to handle heavy loads
E12 Worker's perception that he has to make major efforts in his work to handle heavy loads, combined with constraining postures
"Environmental" WDIs to explore further
E10 Presence of vibration
E13 Presence of prejudice against MSDs in the workplace
E14 Worker's perception that he lacks control over the occurrence of events at work

Table 24. WoDDI-CMD content to retain and content to explore further

"Sociodemographic" WDIs to explore further
S1 Worker's age and changes at work
S2 Sex
S3 Family obligations
S4 Cultural and/or language barriers
S5 Social isolation
S6 Recent occurrence of one or more significant and major personal events
"Clinical" WDIs to retain
C1 Duration of the work absence
C2 Worker's negative perception of his recovery time
C3 Worker is worried about the seriousness of the consequences of his CMD
C4 Severity of the symptoms related to the CMD
C5 Worker has difficulty accepting the fact that he is off work for a CMD
C7 Drug treatment regimen has changed several times
C10 Presence of a comorbidity (physical or mental)
C12 Worker has a history of one or more long-term work absences for a CMD
"Clinical" WDIs to explore further
C6 Worker makes risky use of his medication
C8 Lack of treatment for depression for more than six months since stopping work
C9 Presence in the worker of indications or signs of a work-related post-traumatic stress disorder
C11 Many work absences in the past two years (for three months or longer and for various reasons other than a CMD)
C14 Worker's lack of confidence in the intervention offered to him
"Administrative" WDIs to explore further
A1 Presence of secondary gains during the work absence
A2 Little insurance coverage
A3 Exclusion clauses due to previous CMD history
A4 Presence of a legal dispute
"Occupational" WDIs to retain
O8 Worker's perception that he has a work overload
O9 Presence of competitive atmosphere and high performance and/or productivity requirements in the worker's workplace
O10 Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace
O11 Worker's perception that he is minimally involved in decision making at work
O12 Worker's perception that he receives little recognition from his organization
O13 Worker feels a high level of work dissatisfaction
O14 Major or fast changes have taken place in the worker's organization
O15 Fears stemming from the negative atmosphere and events that occurred right before the worker stopped work
O21 Lack of regular communication between the employer and worker
O23 Worker's perception that the insurer is pressuring him to return to work
"Occupational" WDIs to explore further
O1 One or more failed attempts to return to work (current or past episode)
O2 Worker's perception that his family or friends are pressuring him to return to work
O3 No employment/employer on record in the worker's file
O4 The worker holds a senior management position
O5 Threats or rumours of layoffs in the worker's organization prior to or during his work absence
O6 Job cuts and/or staff reductions during his work absence
O7 Precarious nature of the worker's job
O18 Impact of the gradual return to work on coworkers' workloads
O19 Presence of prejudice against CMDs in the workplace
O22 Worker's perception that the workplace is pressuring him to return to work
O24 Worker's perception that the physician is pressuring him to return to work

PEER REVIEW
In accordance with the IRSST's policies, the results of the research work published in this document have been peer-reviewed.

5.3 Interrater Reliability

For both versions of the WoDDI, interrater reliability for all the WDIs was found to be moderate. Owing to the nature of the instrument (structured interview), this degree of convergence between the raters appears satisfactory. However, the precise breakdown of the results into WDI categories highlights certain elements that could be improved. For example, for the WoDDI-MSD version, Cohen's kappa coefficient was poor for the "personal" category in case history 2, whereas for the WoDDI-CMD version, Cohen's kappa coefficient was acceptable for the "administrative" category in case history 3.

These poorer results could be partly attributable to the method used to train the occupational therapists. For a given case history, the occupational therapists had to attain a 75% concordance rate in their scoring with that of the trainer before being allowed to begin their evaluations using the WoDDI. This was a one-time test and did not cover all the WDIs for either version of the WoDDI. To improve interrater reliability of the instrument, one strategy might be to increase the number of case histories requiring concordance between the trainer and the occupational therapist. Also, the level of agreement required could be raised to 80%. These two strategies would in all likelihood increase the interrater reliability. However, these prerequisites to use of the instrument might also make it slightly less accessible, as they would require more time of clinicians. This consideration should not be overlooked when it is a question of conditions conducive to an instrument's use (Lortie *et al.*, 2013). Moreover, the results obtained for interrater reliability by WDI category and by case history make it possible to clearly pinpoint the weaknesses in the interpretation of the WDIs. Indeed, given that the case histories were designed with a certain distribution of the WDIs, it is easy to identify which ones pose problems. The definitions of the targeted WDIs and how they were transposed into the case histories could be reviewed in order to improve interrater reliability.

Lastly, the results reveal a higher level of interrater reliability for the WoDDI-CMD. A possible explanation for this emerged from discussions with the occupational therapists during the training sessions. Certain WDIs, related mainly to the work environment in the WoDDI-MSD version, appeared to elicit many more questions. For example, some participants wondered how many hours of daily use of a vibrating tool it takes before it becomes a risk factor in itself, or what threshold value (level) of vibration is considered risky. Lastly, they wondered what the minimum duration of a work cycle is for a work task to be considered repetitive and risky. The training for the WoDDI-CMD version did not elicit as many questions, since the risk factors at work were covered in most of the reported perceptions (e.g., work overload or lack of recognition). Despite the fact that specific definitions were given for each of the WDIs in the MSD version, it would therefore appear that certain complementary elements, particularly concerning physical risk factors, could be added and thus reduce the sources of interpretation.

5.4 Convergent Validity

Regarding the comparison of the WoDDI (MSD and CMD) with the validated questionnaires, i.e., the convergent validity, the results obtained were quite different. First, for the WoDDI-MSD version, only half of the associations were statistically significant, but the correlations were very weak. Associations were found between disabilities involving the back, kinesiophobia, and the corresponding WDIs, but not between disabilities involving the neck and upper extremities,

psychological distress, and the associated indicators. There are a few plausible explanations for this.

First, for the WoDDI-MSD, the weak association may be attributable partly to the differences between the concepts measured. The validated, self-report questionnaires measured the intensity of the phenomenon at the time of the evaluation (distress, disability, and kinesiophobia). These elements pertain to the person. By contrast, the WoDDI-MSD required the occupational therapist to assess an impact, namely, whether the presence of these same phenomena (distress, disability, and kinesiophobia) hindered the RTW and maintained the work disability. In other words, two different assessments were required on the basis of the same phenomena. In the original design of the WoDDI, published in 2003, the occupational therapists' representations were triangulated with the scores on the validated questionnaires. The occupational therapists in fact consulted the questionnaires completed by the workers before administering the WoDDI. However, after years of experimentation, the instruction given during training was modified and limited more to the concepts conveyed in the work disability paradigm (the foundation for the instrument). It is therefore not surprising that the results obtained for personal factors (distress, disability, and kinesiophobia) were not strongly associated. For occupational therapists, the presence of disability, kinesiophobia, or distress represents modifiable phenomena on which they will act, even becoming priority targets for intervention. In other words, despite their presence, these phenomena are not perceived as major obstacles.

In the WoDDI-CMD version, associations were found between the "occupational" WDIs and the Job Content Questionnaire (JCQ). These results suggest that for the occupational therapists in our study, the intensity of the work-related factors and their contribution to the return to work were closely related. The explanation may lie in the nature of occupational therapists' field of activity, which focuses primarily on the individual and on the interaction between the individual and the work environment (working methods, margin of manœuvre, and stress management). Their activities are much more restricted when it comes to the broader work environment. While they may make recommendations for the workplace, it may be difficult for them to act on the type of management (non-recognition, low participation in decision making, and work overload) and the work atmosphere (interpersonal conflict). Moreover, a study by Coutu *et al.*, 2015, came up with the same finding, clearly identifying the fact that employers and insurers do not recognize the occupational therapist's role in the internal management of human resources (Coutu *et al.*, 2015). Nonetheless, a link may be established between the occupational therapist's representation that occupational factors can pose major obstacles to the return to work and studies conducted by St-Arnaud *et al.* (2007, 2011), which emphasize that to reduce the probability of failure, it is essential to modify the work environment during a return to work following a depressive episode (Arnaud *et al.*, 2011). In summary, the results of our study converge with those of the St-Arnaud studies, and recognize that if precipitating factors are present in the workplace, a person should not be returned to that same environment. In addition, the results obtained do not suggest any association between the presence of psychological distress and the corresponding WDI (severity of the symptoms). As was the case for MSDs, the occupational therapists probably did not associate the presence of symptoms with work disability, because again, it was a modifiable factor that they would act upon and hence regarded as less important.

Also, given the absence of a gold standard measure, two inventories of causes of work disability maintenance were developed for the purposes of this study. This time, the aim of these

questionnaires and the WoDDI was similar, i.e., measure the impact of the same phenomenon or condition on the maintenance of the work disability. The measurement scales were different, however. For both versions of the WoDDI, even though only the WDIs from the EFAs were included, all the questions converged and were statistically significant, with the exception of two WDIs for the MSD version. These results indicate that, when the occupational therapists were questioned between 24 and 72 hours after administering the WoDDI, their judgments were confirmed as to the impact of certain elements on the maintenance of the work disability. However, these results must be interpreted with a degree of caution. While the two inventories were developed on the basis of a double pretest, they were not subject to wide validation; in addition, several WDIs were removed from the calculations due to their minimal presence (total proportion of scores ranging from 1 to 4 was less than 20%). In addition, approximately 40% only of the WDIs were covered. This clearly deviates from the researchers' initial intentions. On the other hand, it could be argued that this convergence is nothing other than a reflection of the clinician's ability to memorize. In this regard, it should be noted that in both of the inventories developed, several WDIs were combined, and it was unlikely that the clinicians remembered the scores for each of the WDIs before they were combined into a single measure.

5.5 Strengths and Limitations

The aim of this study was to validate an innovative instrument used to measure risk factors for work disability with a sizeable sample of 290 workers who were off work due to an MSD or a CMD. To date, very few instruments covering the various systems of the work disability paradigm exist in the field of work rehabilitation for workers with a CMD. The attempt to validate the CMD version thus represents a worthwhile step forward. Despite the absence of a real standard measure, the methods used to validate the instrument comply with recommendations in the field (Laveault and Grégoire, 2014; Striener, Norman and Cairney, 2015). The results of this study may be generalized only to workers who are absent from work and receiving income replacement indemnities from a public or private insurer that is also responsible for their case management. This limitation restricts the scope of the results obtained for this instrument, and other studies will need to be carried out with more diversified populations.

5.6 Benefits and Implications for Clinicians

One of the benefits of this cross-sectional study was the training of numerous occupational therapists in the work rehabilitation field. This aspect was not studied, but clearly represents a positive impact. On completion of this study, revised and abridged versions of the instrument will be developed and thus be available to health professionals. A recommendation will be made to combine use of the WoDDI with self-report questionnaires as a starting point for a work rehabilitation program. However, in light of the results obtained, new validation studies of the modified instrument will be required.

6. CONCLUSION

Every year, many workers are absent from work due to health problems related primarily to MSDs or CMDs. The Work Disability Diagnosis Interview, or WoDDI, is an instrument consisting of a structured interview designed to better equip health professionals and guide them in the systematic evaluation of factors that could contribute to the maintenance of work disability. Although currently used in several clinics in Québec, until now, the WoDDI had not been the subject of an in-depth validation study. This study's main objective was to study four psychometric properties of the two versions of the instrument developed respectively for individuals with MSDs or CMDs. Despite the weaknesses reported, the content of the WoDDI, taking into account the reduced number of items proposed, appears to correspond well to the current scientific literature on the populations under study and to reflect a biopsychosocial understanding of workers in work disability situations. However, the WoDDI version for workers with common mental disorders needs to be revised and re-tested. The convergent validity also requires further exploration.

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APPENDIX A

A.I WDIs-MSD

"Personal" work disability indicators (P)

P1. Worker's age: The worker is older than 42 years of age. This age is often associated with a poorer capacity to adapt to new tasks or technologies and/or with a degree of "wear and tear" of the physical structures that may be used when performing physically demanding work. This WDI must be weighted in terms of the type of job (level of demand) and the presence of current or planned changes in the work station.
P2. Diagnostic label: When a physician issues a specific diagnosis (e.g., disc herniation, ankylosing spondylitis) and it takes on a notion of seriousness in the worker's mind. *For example: a worker who receives a diagnosis of disc herniation rather than low back pain sees this clearly as a more serious health problem.*
P3. Ongoing medical investigation/treatment: Presence of medical examinations **AND/OR** treatments currently in progress **OR** to come, specifically in relation to the musculoskeletal injury **AND** this delays the worker's reactivation.
P4. Worker's perception of an unfinished medical investigation/treatment: The worker sees his musculoskeletal condition as requiring additional examinations and/or treatments **OR** has the perception that his health problem has not yet been diagnosed **AND** this hinders his reactivation.
P5. Erroneous illness (treatment) representation: The worker has erroneous thoughts, beliefs, and attitudes about one or more of the following: (1) consequences of the illness, (2) causes, (3) diagnosis, (4) symptoms, (5) treatment, (6) progression and prognosis.
P6. Worker has poor knowledge of his condition and recovery prognosis: The worker does not understand his diagnosis and does not know what is going to happen to him.
P7. Perception of a serious injury: The worker sees his condition as a serious problem.
P8. Worker's perception of a failed therapy or dissatisfaction with the care received: The worker indicates that the care received was not effective for his problem **OR** he is dissatisfied with the care, treatments, or interventions received to date.

P9. Presence of a comorbidity (physical or mental):

One or more other diagnoses are present in the worker's medical history, in addition to his current health problem.

P10. Presence of physical sequelae resulting from a previous event:

The worker experiences persistent physical symptoms beyond the recovery period for a prior event.

For example: Mr. B. underwent back surgery in the past and still has reduced spinal mobility, or Ms. C. has a skin adhesion following an accident.

P11. Previous medical history (accidental or other):

The worker had a previous medical history (injuries, illnesses, surgeries, or other) before his current health problem.

P12. Worker has a history of one or more long-term work absences for a musculoskeletal problem:

The worker has previously been off work for musculoskeletal problems, and the work absence(s) lasted longer than the normal healing/recovery period.

P13. Signs or symptoms of a neurological deficit:

The worker reports numbness or paresthesia in the same painful territory **AND/OR** presents signs of a nerve root impairment.

P14. Syndrome of pain referring to below the knee:

The worker reports feeling pain below the knee.

P15. Pain management:

The worker uses minimally effective or ineffective pain management strategies **AND**
this prevents him from doing his regular activities.

P16. Persistent pain syndrome:

The presence of pain beyond the normally expected recovery period.

P17. Suspected generalized physical deconditioning:

The worker reports a significant decrease in his physical activities since his health problem **OR** breathlessness during activities **OR** a major weight gain **OR** a major loss of muscle mass.

P18. Sedentary lifestyle:

The worker did few sports **OR** active leisure activities prior to his health problem.

P19. Alcohol and/or drug abuse problem:

The worker's alcohol, drug, or medication consumption may pose an obstacle to a reactivation and RTW process.

P20. Family obligations:

The worker has obligations regarding dependants **AND**

it is currently difficult (physically, emotionally, or financially) to meet these obligations.
P21. Cultural and/or language barriers: The worker has major difficulty reading, speaking, and understanding English or French **OR** His cultural differences make it difficult for him to take responsibility for his rehabilitation.
P22. Social isolation: The worker has no social or family network to provide him with support.
P23. Recent occurrence of one or more significant and major personal events: During the past year, the worker has experienced personal events causing major stress (e.g., death; illness; family, marital, or financial problems; moving). *For example: Mr. B. recently went through a divorce, his mother was seriously ill, or his brother died.*
P24. Worker's perception that his pre-injury family income was inadequate: This situation pushes the worker to return to work faster even though he does not feel ready yet.
P25. Worker feels a high level of work dissatisfaction: The worker sees a big gap between his current situation and the situation he would like to see at work.
P26. Worker does not see himself in his regular job: The worker cannot see himself back at his regular work **either now or in three months,** for various reasons (physical, mental, social, financial).
P27. Worker indicates that his current capacities do not meet the requirements of his regular job: The worker reports that his physical condition (e.g., strength, endurance, dexterity, ranges of joint motion) **OR** his current mental condition is not good enough to allow him to perform his regular work tasks.
P28. Worker is very fearful about returning to work: The worker expresses a number of major fears and worries about returning to his work (e.g., fear of how his supervisor will welcome him back, of aggravating his pain at work, of being quickly overloaded with work).
P29. Presence of kinesiophobia: The worker has an excessive and irrational fear of doing physical activities and of moving, which stems from the fear of injuring or reinjuring himself or of aggravating his condition.
P30. Presence of catastrophic thinking about pain: The worker has an exaggeratedly negative belief about and focus on harmful stimuli (anything that could cause or trigger pain; the pain itself).
P31. Worker's perception that he has a major physical disability: The worker perceives his capacity to carry out an activity normally, or within what are considered

normal limits, as being partially or totally reduced.

P32. Signs or symptoms of psychological distress:

The worker displays signs or symptoms of negative reactions to stress.

For example: Mr. B. has difficulty coping or making decisions because he dwells on all the potential consequences of each decision.

"Administrative" work disability indicators (A)

A1. Prolonged administrative inactivity prior to referral:

When no treatment or service has been offered to the worker for a period of more than three months between the start of the work absence and now.

A2. Presence of functional limitations:

The worker has been assessed with functional limitations by his treating physician or a medical expert.

N.B.: In Québec, functional limitations are recommendations issued by the treating physician and identifying the movements or postures likely to pose problems or that risk being harmful to the worker.

A3. Lack of concerted action:

The worker perceives different messages from the various health professionals regarding his injury (diagnosis, treatment, investigation, prognosis) and also from the other parties involved in his case (insurance representative, supervisor, union representative).

A4. One or more failed attempts to return to work (current or past episode):

The worker tried to RTW recently or in the past, but the attempt failed.

A5. Potential presence of secondary gains during the work absence:

The worker mentions having income that exceeds or is equivalent to the amount of his usual salary **OR**

during his work absence, the worker receives one or more financial incentives **OR**

the worker identifies positive impacts of his work absence (time, savings, presence in his family, etc.).

A6. Presence of a legal dispute:

Any form of contestation by an actor involved in the case (employer, insurer, or worker).

For example: During an employer's phone call to Mr. B., the employer tells him that he is requesting a medical evaluation to validate the diagnosis issued by Mr. B's physician.

A contestation is filed by either the employer, the worker, the insurer, or another authority for the purpose of questioning the link between the injury and the accidental event, the diagnosis, the adequacy of the treatments, the consolidation, or the functional limitations. Regardless of where it originates, any such legal action may be considered unfair by the worker and as indicating a feeling of non-confidence.

A7. No employment/employer on record in the worker's file:

The worker no longer has a job reserved for him in an organization, but the contractual relationship still exists **OR**

the worker no longer has either an employer or a job to eventually return to.
A8. Long-term absence from regular work: The worker has not held his **regular job** for a period of time exceeding the normal recovery time, **BUT** he is participating in another form of work at his employer's (e.g., temporary assignment, light tasks, gradual return to another job).
A9. Long-term absence from any form of work in the company: The worker has not participated in any form of work in his company for a period of time exceeding the normal recovery time.
A10. Recent job tenure at the employer's: The worker has been employed by the organization for only a short period of time (less than one year). This WDI must be weighted in terms of the worker's activity sector. In the construction industry, among others, contracts can be of short duration and workers change employers often. By contrast, in government agencies, jobs are stable. *For example: Mr. B. has been working in the hospital care sector for six months.*
A11. Lack of a clearly defined occupational goal: The worker, the insurance representative **OR** the employer has not clearly identified the job targeted for the worker's reintegration.

"Environmental" work disability indicators (E)

E1. Worker's perception of inadequate organization of the work: The worker mentions that the conditions under which the work is performed are inadequate (e.g., a fast work pace or speed, rotation between work stations with little or no light work, lack of resources making it almost impossible to carry out the work, a piecework remuneration system).
E2. Worker's perception of a high level of occupational stress: The worker sees major sources of stress in his work **AND** this influences his job performance **AND/ OR** affects his symptoms (increased muscle tension or pain). *For example: Mr. B. feels tenser because he has to supervise new employees and his expectations of them are high.*
E3. Presence of work equipment that the worker regards as inadequate: The worker mentions that the pieces of equipment supplied by the employer for him to perform his work are obsolete or poorly adapted **OR** that they are not available to facilitate his work.
E4. Presence of a tense atmosphere or interpersonal conflicts at work: The worker perceives a generally tense atmosphere at work or the presence of interpersonal conflicts

between employees, between supervisors, or between employees and supervisors.

E5. Presence of constraining postures:

The worker reports having to adopt, in the context of his regular work, extreme postures nearing the limits of his ranges of joint motion (e.g., his wrist is maintained in an extremely flexed or extended position).

OR

demanding postures if, for example, he has to maintain these positions to counter gravity (e.g., a position where his arm is kept extended in front of his body (shoulder flexion).

OR

risky positions that may compromise anatomical structures due to the adoption of wrong positions in order to be able to work effectively (e.g., keeping arms above shoulder level).

E6. Presence of work activities with repetitive components or involving repetitive tasks:

The worker reports that it is always the same musculoskeletal structures that he has to use in performing certain tasks or most tasks, and that he has little or no time to recover.

E7. The worker's perception of an inadequate layout of his work station:

The worker mentions that his work station is not set up in a way that facilitates his work activity (e.g., confined space, parts or tools placed outside the reach zone, clutter).

E8. The worker's perception that he does not have enough recovery time:

The worker reports not having the opportunity to take breaks or being obliged to work overtime without being entitled to a recovery period.

E9. Presence of a prolonged static work posture:

The worker reports that he has to maintain positions with no possibility of a break, which can cause reduced blood flow to the muscles and quickly cause muscle fatigue (e.g., working with his shoulders above shoulder level, working with his back flexed).

For example: Mr. B. works in front of a monitor in a stationary position, with his neck tilted forward and hands maintained in radial deviation above the keyboard.

E10. Presence of vibration:

The worker reports being exposed to vibrations (e.g., if he has to handle electric or pneumatic tools), which can lead to the onset of vascular problems, neurological disorders, or joint disorders. Exposure to vibrations is combined with the fact that he often has to exert more force when using a vibrating tool.

E11. Worker's perception that he has to make major efforts in his work to handle heavy loads:

The worker reports that he has to lift, carry, push, pull or handle very heavy objects, parts, tools, materials, or pieces of equipment in his regular work

OR

the worker reports that he has to transport or support loads during his regular work (e.g., hoisting, placing, pushing, gripping, carrying, moving), tasks that require major physical effort due to their characteristics or the conditions under which they are performed.

E12. Worker's perception that he has to make major efforts in his work to handle heavy loads, combined with constraining postures:

The worker reports that he has to lift, carry, push/pull, or handle very heavy objects, parts, tools, materials or pieces of equipment in his regular work **AND**

he does so in constraining postures (see definition of constraining posture).

E13. Presence of prejudice against MSDs in the workplace:

Some people in the workplace have negative, preconceived ideas about workers with musculoskeletal disorders (that they are lazy, complainers, etc.).

E14. The worker's perception that he lacks control over the occurrence of events at work:

The worker is afraid he will not be able to manage sudden and unforeseen situations or events in his current condition.

For example: Mr. B. says that if his coworker is absent and hoisting equipment is not available, he will not be able to perform his work tasks.

A.II WDIs-CMD

"Sociodemographic" work disability indicators (S)

S1. Worker's age and changes at work:
The worker is 44 years of age or older
AND
before or during his absence, is faced with major organizational/technological changes at work. This could make it difficult for him to adjust.
For example: The files and appointment calendars are currently being computerized at the medical clinic where Ms. B. (who is 52 years old) works.

S2. Sex:

- The worker is male
  AND
- has a weak social support network **OR** consulted a health professional several weeks or months after his symptoms began.

- the worker is female
  AND
- receives a diagnosis of major depression.

S3. Family obligations:
Family obligations reduce the rest time that the worker needs to recover.

S4. Cultural and/or language barriers:
The worker has major difficulty reading, speaking and understanding English or French
OR
his cultural differences make it difficult for him to take responsibility for his rehabilitation, a difficulty related to his representations of the medical system.

S5. Social isolation:
The worker has no social or family network to provide him with support.

S6. Recent occurrence of one or more significant and major personal events:
During the past year, the worker has experienced personal events causing major stress, such as a divorce, serious illness, or the death of a loved one.

"Clinical" work disability indicators (C)

C1. Duration of the work absence:
The worker has been off work for one year or more.

C2. Worker's negative perception of his recovery time:
The worker does not believe, or has a hard time believing, that his condition can improve quickly.
For example: Mr. B. thinks it will be a very long time before he is back in shape; he does not see how he could feel an improvement soon.

C3. Worker is worried about the seriousness of the consequences of his CMD:
The worker has recurrent, excessive thoughts about his mental health problem and the possibly related consequences **AND**
this distresses him.
For example: Ms. B. says she is afraid of losing her job because of her problem; she is also afraid that the situation is moving her toward a divorce, with all the tensions experienced in her marriage.

C4. Severity of the symptoms related to the CMD:
The symptoms are so major that they prevent the worker from functioning in most areas of activity in his life. It is the intensity of the symptoms reported that matter more than their consequences.
For example: Mr. B. complains of major memory loss; he says he forgets everything, little things as well as big things. He also says he has no concentration, that he is unable to read a single newspaper article.

C5. Worker has difficulty accepting the fact that he is off work for a CMD:
The worker has a hard time accepting the diagnosis he has been given and the fact that he is off work for this reason.

C6. Worker makes risky use of his medication:
The worker does not take his medications as prescribed (e.g., changes the dose, the frequency, periodically stops taking it) **OR**
He also takes products that are not prescribed, in order to improve his symptoms.
For example: Mr. B. only takes his depression medication on days when he does not feel very good. Then he takes double the prescribed dose, and as soon as he feels better, he stops taking it again. Occasionally he take Gravol to help him sleep.

C7. Drug treatment regimen has changed several times:
The medication(s) prescribed has (have) been changed by the physician more than twice in the six months following the diagnosis, usually because the anticipated effects are slow to kick in.
For example: Ms. B.'s physician completely changed her medication three times in the past six months because her condition did not seem to improve quickly enough.

C8. Lack of treatment for depression for more than six months since stopping work:
The worker, who was given a diagnosis of depression, did not do any treatment, either in the form of medication or psychotherapy, during his first six months off work.

C9. C10. Presence in the worker of indications or signs of a work-related post-traumatic stress disorder:
Indications or signs that the worker fears for his physical and/or psychological well-being at work (Brillon, 2010) and that this has persistent effects on his current ability to function.
For example: Since the start of his work absence, Mr. B. has had the same nightmare every night; he sees his fellow police officer being shot again and sees himself as unable to move, petrified by fear.

C10. Presence of a comorbidity (physical or mental):
In addition to the mental health problem, one or more other diagnoses are currently present in the worker's medical file.
For example: Ms. B. suffers from diabetes in addition to her problem of major depression.

C11. Many work absences in the past two years (for three months or longer and for various reasons other than a CMD):
Several work absences in the past two years have been justified by *reasons other* than a mental health problem.

C12. Worker has a history of one or more long-term absences from work due to a CMD:
One or more prior absences from work due to a mental health problem.

C13. Alcohol and/or drug abuse:
Alcohol or drug consumption may pose an obstacle to a RTW process.

C14. Worker's lack of confidence in the intervention offered to him:
The worker does not believe that the rehabilitation intervention can help him in his situation.

"Administrative" work disability indicators (A)

A1. Presence of secondary gains during the work absence:
The worker mentions having income that exceeds or is equivalent to the amount of his usual salary **OR** during his work absence, the worker receives one or more financial incentives **OR**
the worker identifies positive impacts of his work absence (time, savings, more present in his family, etc.).

A2. Little insurance coverage:
The coverage is inadequate to allow the worker to do the treatments required for his condition
OR
the type of insurance contract offers coverage that is disadvantageous to the worker, which pushes him to return to work faster even though he does not feel ready.
For example: to go to his psychotherapy sessions means incurring additional daycare costs, and it is impossible for Mr. B. to pay them with his current indemnities.
For example: Ms. B. has not been able to make ends meet since her work absence, and she intends to return to work right away even if she does not feel at all ready.

A3. Exclusion clauses due to previous CMD history: The worker's claim for income replacement indemnities is refused due to his declaration of prior episodes of work absence related to a mental health problem.
A4. Presence of a legal dispute: Any form of contestation by an actor involved the file (employer, insurer, or worker). *For example: During the employer's phone call to Mr. B., the employer tells him that he is requesting a medical evaluation to validate the psychiatrist`s diagnosis.*

"Occupational" work disability indicators (O)

O1. One or more failed attempts to return to work (current or past episode): The worker tried to return to work recently or in the past, but this attempt failed.
O2. Worker's perception that his family or friends are pressuring him to return to work: The worker perceives his social environment as pressuring him to RTW **AND** he regards this pressure as an additional stress.
O3. No employment/employer on record in the worker's file: The worker no longer has an employer or has lost his regular job.
O4. Worker holds a senior management position: The fact of holding a senior management position represents a work disability indicator. This type of job is often associated with a high level of responsibility, delayed consultation, or lack of support from coworkers.
O5. Threats or rumours of layoffs in the worker's organization prior to or during his work absence: The worker has heard rumours of layoffs **AND** this worries him.
O6. Job cuts and/or staff reductions during his work absence: During the worker's absence, staff was reduced and tasks were redistributed or modified.
O7. Precarious nature of the worker's job The worker has a contractual position **OR** is self-employed.
O8. Worker's perception that he has a work overload: The worker considers that he has to perform overly complex and demanding tasks or too many tasks in his regular work, and this worries him in terms of his return to work.
O9. Presence of competitive atmosphere and high performance and/or productivity requirements in the worker's workplace: The workplace is characterized by a competitive culture and high performance and/or productivity demands.
O10. Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace: The worker perceives a generally tense atmosphere at work or the presence of interpersonal conflicts between employees, between supervisors, or between employees and supervisors.
O11. Worker's perception that he is minimally involved in decision making at work: Before stopping work, the worker had to cope with the consequences of decisions that affected him closely, but about which he had not been consulted.
O12. Worker's perception that he receives little recognition from his organization: The worker considers that the work he does is not recognized or appreciated for its true value by his superiors or peers.
O13. Worker feels a high level of work dissatisfaction: The worker perceives a big gap between his current situation and the situation he would like to see at work.
O14. Major or fast changes have taken place in the worker's organization: Changes have been made in the job description, the way the work is organized, or the worker's work methods.

O15. Fears stemming from the negative atmosphere and events that occurred right before the worker stopped work:
His departure from work was accompanied by negative events associated with his mental health problem.
For example: During the weeks prior to her departure, Ms. B. was very irritable and got angry at her coworkers on several occasions. She made hostile, inappropriate remarks to two of them in particular, including her direct supervisor. Everyone blamed her for her lateness and the poor quality of her work. This worries her as she prepares to return to work.

O16. Worker's fears about returning to work:
Presence of fears about work that could hinder the RTW process.
For example: Ms. B. is afraid she will not able to do her job again when she returns to work.

O17. Few accommodations possible in the job the worker is expected to return to:
In the work context to which the worker is expected to return, it seems that few work parameters can be modified either temporarily or permanently to facilitate his return.

O18. Impact of the gradual return to work on coworkers' workloads:
The worker's planning of his gradual resumption of his work tasks will increase his coworkers' workload.

O19. Presence of prejudice against CMDs in the workplace:
Some people in the workplace have negative, preconceived ideas about workers with mental health problems.

O20. Worker's perception that he lacks control over the occurrence of events at work:
In his regular work, the worker has to cope with sudden and unforeseen situations or events
AND
he fears he will be unable to manage these situations in his current condition.
For example: In his usual delivery work, Mr. B. constantly has to revise his travel plans for the day due to delays, urgent new orders, and road work. He does not see how he could manage that at this time due to his difficulty concentrating.

O21. Lack of regular communication between the employer and worker:
During the worker's work absence, there was little or no communication between him and his employer.

O22. Worker's perception that the workplace is pressuring him to return to work:
The worker perceives his workplace as pressuring him to return
AND
he regards this pressure as an additional stress.
For example: Ms. B.'s direct supervisor contacted her several times during the last three months to find out the date of her RTW. Each time she mentioned the work overload on the team. Ms. B. is worried by these repeated calls.

O23. Worker's perception that the insurer is pressuring him to return to work:
The insurer demands to know the date of his return to work **OR** exerts pressure regarding the RTW
AND
the worker regards this as an additional stress.

O24. Worker's perception that the physician is pressuring him to return to work:
The worker's physician recommends that he return to work soon
AND
the worker regards this as an additional stress.

APPENDIX B

B.I Correspondence between the WDIs-MSD and dimensions of the Inventory of Causes of Work Disability Maintenance

Indicator	Question
P1 Worker's age P20 Family obligations	Estimate the impact of his sociodemographic characteristics (4)
P2 Diagnostic label P4 Worker's perception of an unfinished medical investigation/treatment P5 Erroneous illness (treatment) representation P6 Worker has poor knowledge of his condition and recovery prognosis P7 Perception of a serious injury P26 Worker does not see himself in his regular job P31 Worker's perception that he has a major physical disability	Estimate the impact of the worker's understanding of his current medical condition (10)
P3 Ongoing medical investigation/treatment P8 Worker's perception of a failed therapy or dissatisfaction with the care received P9 Presence of a comorbidity (physical or mental) P10 Presence of physical sequelae resulting from a previous event P11 Previous medical history (accidental or other) P13 Signs or symptoms of a neurological deficit P14 Syndrome of pain referring to below the knee P17 Suspected generalized physical deconditioning P19 Alcohol and/or drug abuse problem P32 Signs or symptoms of psychological distress	Estimate the impact of his current medical condition (6)
P12 Worker has a history of one or more long-term work absence(s) for a musculoskeletal problem	Estimate the impact of one or more prior episodes of work absence due to a similar problem (11)
P15 Pain management	Estimate the impact of the pain management strategies adopted (13)
P16 Persistent pain syndrome	Estimate the impact of the pain felt (15)

P27 Worker indicates that his current capacities do not meet the requirements of his regular job	Estimate the impact of the worker's perception of a gap between his current capacities and the requirements of his job (1)
P28 Worker is very fearful about returning to work P29 Presence of kinesiophobia	Estimate the impact of the worker's fears of re-injuring himself or of aggravating his pain (9)
A1 Prolonged administrative inactivity prior to referral A3 Lack of concerted action	Estimate the impact of the medical/administrative management of his work-related accident or disability file (2)
A4 One or more failed attempts to return to work (current or past episode)	Estimate the impact of his previous failed attempts to return to work (14)
A5 Potential presence of secondary gains during the work absence	Estimate the impact of the presence of secondary gains during the work absence (financial or other) (7)
A6 Presence of a legal dispute	Estimate the impact of the presence of a legal dispute (12)
A11 Lack of a clearly defined occupational goal	Estimate the impact of the lack of a clearly defined occupational goal (3)
E1 Worker's perception of inadequate organization of the work E3 Presence of work equipment that the worker regards as inadequate E4 Presence of a tense atmosphere or interpersonal conflicts at work E7 Worker's perception of an inadequate layout of his work station E13 Presence of prejudice against MSDs in the workplace	Estimate the impact of his pre-absence work environment (5)
E5 Presence of constraining postures E6 Presence of work activities with repetitive components or involving repetitive tasks E8 Worker's perception that he does not have enough recovery time E9 Presence of a prolonged static work posture E10 Presence of vibration E11 Worker's perception that he has to make major efforts in his work to handle heavy loads E12 Worker's perception that he has to make major efforts in his work to handle heavy loads, combined with constraining postures	Estimate the impact of the physical risk factors related to his job (8)

B.II Correspondence between the WDIs-CMD and dimensions of the Inventory of Causes of Work Disability Maintenance

Indicators	Questions
S1 Worker's age and changes at work S2 Sex S3 Family obligations S4 Cultural and/or language barriers S5 Social isolation S6 Recent occurrence of one or more significant and major personal events	Estimate the impact of his sociodemographic characteristics (3)
C1 Duration of the work absence	Estimate the impact of the duration of the current work absence episode (15)
C2 Worker's negative perception of his recovery time C3 Worker is worried about the seriousness of the consequences of his CMD C5 Worker has difficulty accepting the fact that he is off work for a CMD	Estimate the impact of the worker's understanding of his current medical condition (9)
C4 Severity of the symptoms related to the CMD C6 Worker makes risky use of his medication C7 Drug treatment regimen has changed several times C8 Lack of treatment for depression for more than six months since stopping work C9 Presence in the worker of indications or signs of a work-related post-traumatic stress disorder C10 Presence of a comorbidity (physical or mental) C13 Alcohol and/or drug abuse	Estimate the impact of his current medical condition (5)
C12 Worker has a history of one or more long-term work absences for a CMD	Estimate the impact of one or more prior work absences for a mental health problem (10)
A1 Presence of secondary gains during the work absence	Estimate the impact of the presence of secondary gains during the work absence (financial or other) (6)
A4 Presence of a legal dispute	Estimate the impact of the presence of a legal dispute (11)

O1 One or more failed attempts to return to work (current or past episode)	Estimate the impact of previous failed attempts to return to work (13)
O2 Worker's perception that his family or friends are pressuring him to return to work O22 Worker's perception that the workplace is pressuring him to return to work O23 Worker's perception that the insurer is pressuring him to return to work O24 Worker's perception that the physician is pressuring him to return to work	Estimate the impact of social pressure exerted by one or more persons for him to return to work (7)
O4 Worker holds a senior management position	Estimate the impact of the work responsibilities associated with a senior management position (12)
O7 Precarious nature of the worker's job	Estimate the impact of job insecurity at the employer's (17)
O8 Worker's perception that he has a work overload	Estimate the impact of the worker's perception of having a work overload (19)
O9 Presence of competitive atmosphere and high performance and/or productivity requirements in the worker's workplace O10 Presence of a tense atmosphere or interpersonal conflicts in the worker's workplace O11 Worker's perception that he is minimally involved in decision making at work O12 Worker's perception that he receives little recognition from his organization O19 Presence of prejudice against CMDs in the workplace	Estimate the impact of his pre-absence work environment (4)
O13 Worker feels a high level of work dissatisfaction	Estimate the impact of the worker's job dissatisfaction prior to the start of his work absence (8)
O14 Major or fast changes have taken place in the worker's organization	Estimate the impact of major or fast changes the employer has made in the organization (16)
O15 Fears stemming from the negative atmosphere and events that occurred right before the worker stopped work	Estimate the impact of the worker's fears about returning to work (14)
O16 Worker's fears about returning to work	Estimate the impact of the worker's perception of a gap between his current capacities and the requirements of his job (1)
O17 Few accommodations possible in the job the worker is expected	Estimate the impact of the absence or lack of accommodations at

to return to	work (18)
O21 Lack of regular communication between the employer and worker	Estimate the impact of the absence or lack of communication between the absent worker and his employer (2)