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Influences of Labour Participation Among Persons With Disabilities: A Systematic Review and Best Evidence Synthesis

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ABSTRACT

Asystematic literature review was conducted to assess the individual, organization, societal, and legal influences of labour participation among individuals with a disability. *Methods*: Nine databases were searched, for peer-reviewed studies of individual, organization, societal, and legal influences among disabled populations published between 1990 and 2010.

Results: Of a total of 809 papers initially selected, only 46 studies were deemed to be of sufficient quality to be included in the review. *Conclusions*: Numerous studies have examined labour participation among persons with physical disabilities, some among persons with chronic disabilities, and few among persons with mental disabilities. Strong evidence was found for individual and organization influences of labour participation among persons with physical disabilities in particular pain, catastrophising, job strain, and support. Only individual influences provided strong evidence among persons with chronic disabilities and no influences provided strong evidence among those with mental disabilities. The results are presented along with methodological weaknesses and future recommendations.

A systematic review was conducted to synthesise evidence of individual, organization, societal, and legal influences that contribute to labour force participation among persons with disabilities. Nine research databases were reviewed in 2010 using Boolean searches that combined all possible combinations of (a) disability terms, (b) influence of labour participation terms, and (c) employment terms. Influences of labour participation were examined among three different classes of disability (i.e., physical disability, chronic disability, and mental disability). The primary outcomes considered were employment status, return to work, and disability status. Quantitative studies achieving an average score of 2.5 or greater on a 14-item quality appraisal form were eligible for inclusion and moved to data extraction. Contextual factors, influences of labour force participation, and study design characteristics were extracted and analysed using a best evidence synthesis approach. Best evidence synthesis based the strength of a relationship on the quality, quantity, and consistency of the available data. Thus, the best available evidence for individual, organization, societal, and legal influences of labour force participation among persons with disabilities was synthesised and classified into categories (i.e., strong, moderate, limited, mixed, insufficient/no evidence).

Methods

Literature Search

We developed an a priori protocol. Research databases were reviewed in 2010 and included: Business Source Primer, PsycInfo, Regional Business News, ERIC, Medline, Economics Intelligence Unit, Source OECD, REPec and ProQuest. The search strategy combined three groups of terms using an 'AND' classifier. The first group included disability terms, the second included types of influence (individual, organization, societal or legal), and the third group consisted of employment or unemployment terms. Articles written in English between 1990 and 2010 were included in this search. Grey literature was not considered.

Study Relevance

This review focused exclusively on the working aged population (16–65 years). Inclusion and exclusion criteria for eligible studies are located in Table 1; select criteria requiring further explanation are discussed later.

Population of Interest

Studies involving persons with disabilities were classified into one of three groups based upon the nature of the disability. First, populations of workers with disabilities who suffered from acute disabilities or a disorder involving tissue damage were classified as persons with physical disability. Second, those who suffered from a long-term and irreversible disorder from which full recovery was unlikely were classified as persons with chronic disability. Third, employees off work as a result of a mental illness were classified as persons with mental disability.

Persons with physical disability was a homogenous category that included low back pain, musculoskeletal disorder, spinal conditions, whiplash, carpel tunnel syndrome, surgery, and burns. Persons with chronic dis- ability was more heterogeneous including stroke, neuromuscular disorder, and multiple sclerosis. Finally, the most heterogeneous condition was persons with mental disability that included body-dysmorphic disorder and schizophrenia.

TABLE 1

Inclusion Criteria

	Inclusion	Exclusion
Population of interest	Workers with a disability who are off work with one of the following: • Physical disability • Mental disability • Chronic disability	Special populations: • Young offenders Severely limiting and prevalent disabilities: • Mental retardation • Developmental disability
Study design —quantitative	• Random controlled trials (RCT) • Nonrandomised trial • Cross-sectional • Longitudinal • Case control • Cohorts (retrospective and prospective)	• Noncomparative studies: case series, case study • Unpublished thesis • Systematic reviews • Manuals • Supported employment
Outcomes	• Work disability duration: time to return to work, time on benefits, total lost time; Point prevalence status (e.g., back at work versus not back at work). • Risk and protective factors of labour force participation that fit the following categories: o individual o organisational o societal o legal	• Studies predicting disability rather than labour force participation

Study Design

We cast a wide net to include the full range of study designs used in evaluating labour force participation among people with disabilities. Main outcomes considered were return to work, employment

status, disability status, and duration of disability leave. Study designs were categorised using a tool developed by Briss and colleagues (2000) for the Task Force on Community Preventive Services.

Quality Appraisal

Quantitative studies meeting inclusion criteria were assessed for methodological quality based on work by Tompa, Oliveira, Dolinschi, and Irvi (2008). The quality assessment tool consisted of 14 specific content questions that were ranked on a 5-point Likert scale.

Two reviewers assessed the quality of each study, in which the average score across the 14 items constituted the final score for the study. For assessment, each re- viewer considered some representative questions:

- Was the conceptual basis of, and/or the need for the study explained and sound?
- Was the study clearly described?
- Were the study population and context clearly described?
- How well are confounding influences controlled by study design?
- Were appropriate statistical analysis conducted?
- Was there a lengthy delay between the research study, data analysis and publication?
- Did the conclusion and presentation of the study results accurately reflect the research findings?

A study with a final score between 1 and 2.4 was considered to provide low-quality evidence. A final score between 2.5 and 3.4 represented medium-quality evidence, and a score between 3.5 and 5 indicated high- quality evidence.

TABLE 2

Best Evidence Synthesis Guidelines

	Study quality	Minimum number of studies
Strong evidence[a,b]	High	3
Moderate evidence[c,d]	High and medium	2 high quality, or 3 of medium and high quality
Limited evidence[e,f]	High and medium	1 high-quality; 2 medium-quality studies or 2 studies, one of which is medium quality and the other is high quality
Mixed evidence	High and medium	Findings from medium- and high-quality studies are contradictory
Insufficient/No evidence	Medium	No high-quality studies/1 or no medium-quality studies

Note: a = If there are only three high quality studies, all studies must report consistent findings; b = at least three quarters ($\geq$ 3/4) of high and medium quality studies must report consistent findings. c = The two high quality studies must agree, or the 3 studies constituting a mixture of medium and high quality must agree; d = if there are four or more studies of medium and high quality than two thirds ($\geq$ 2/3) of all studies must report consistent findings. e = If there are two studies, the studies must agree; f = the majority ($\geq$ 50%) of medium- and high-quality studies must report consistent findings.

Data Extraction

A data extraction tool was created based upon the de- sign of the systematic review. The data extraction tool pulled three areas of evidence from each study: (a) con- textual factors such as country of origin, disability type, and relevant demographic characteristics; (b) individual, organization, societal or legal Influences of labour force participation; and (c) characteristics of the study design and related statistical analysis. This tool was tested and refined by the research team in a process of application, review, and reapplication during the analysis of several studies.

Evidence Synthesis

The heterogeneity present in this area of research precludes the use of such techniques as meta-analysis. Therefore, we elected to use a 'best evidence synthesis' approach (Slavin 1986; Slavin 1995), which has been used in other systematic reviews with similar foci (Bron- fort, Haas, Evans, & Bouter, 2004; Tompa et al., 2008). This approach bases the strength of a relationship on the quality, quantity, and consistency of the available data. Quality refers to the methodological quality, quantity refers to the number of studies, and consistency refers to the stability of results across studies. Studies were ranked on a five-level scale consisting of *strong evidence*, *moderate evidence*, *limited evidence*, *mixed evidence*, and *insufficient/no evidence*. The three levels of evidence (strong, moderate, limited) were cascaded down until a set of criteria was met. If the evidence met none of the criteria it defaulted to *mixed evidence* or *limited/no evidence*. The evidence ranking system can be found in Table 2. The process of best evidence synthesis was performed for each category of disability separately.

Quantification of Effects

All relevant statistics (e.g., odds ratios, F statistics, correlations, χ^2) were converted into standardised effect sizes as Cohen's d in order to facilitate comparison across selected studies. Odds ratios and their associated 95% confidence intervals were transformed into d by dividing the natural logarithm of the odds ratio ln (odds ratio) by the approximate distance in the normal equivalent deviate (NED) of the log odds (see Chinn, 2000). Correlation (r) values were transformed using a method developed by Friedman (1968). To standardise nonparametric tests, χ^2 values were computed into r (see Wolf, 1986), which was then computed into a d. Finally, articles reporting proportions were converted into an odds ratio and then into a Cohen's d. Results of this process can be found in Table 3.

Results

Literature Search

Our systematic review evaluated 809 articles for inclusion (See Figure 1 for an illustration of the review process). Only 47 articles met our inclusion and exclusion criteria and were subject to quality assessment. The quality assessment ratings made by the two reviewers showed excellent consistency, $r(51) = .75$, $p < .01$. One article (Berger, 2000) provided low-quality evidence and was excluded on this basis leaving 46 articles. Twenty-four studies provided medium-quality evidence, and 22 provided high-quality evidence (refer to Table 3).
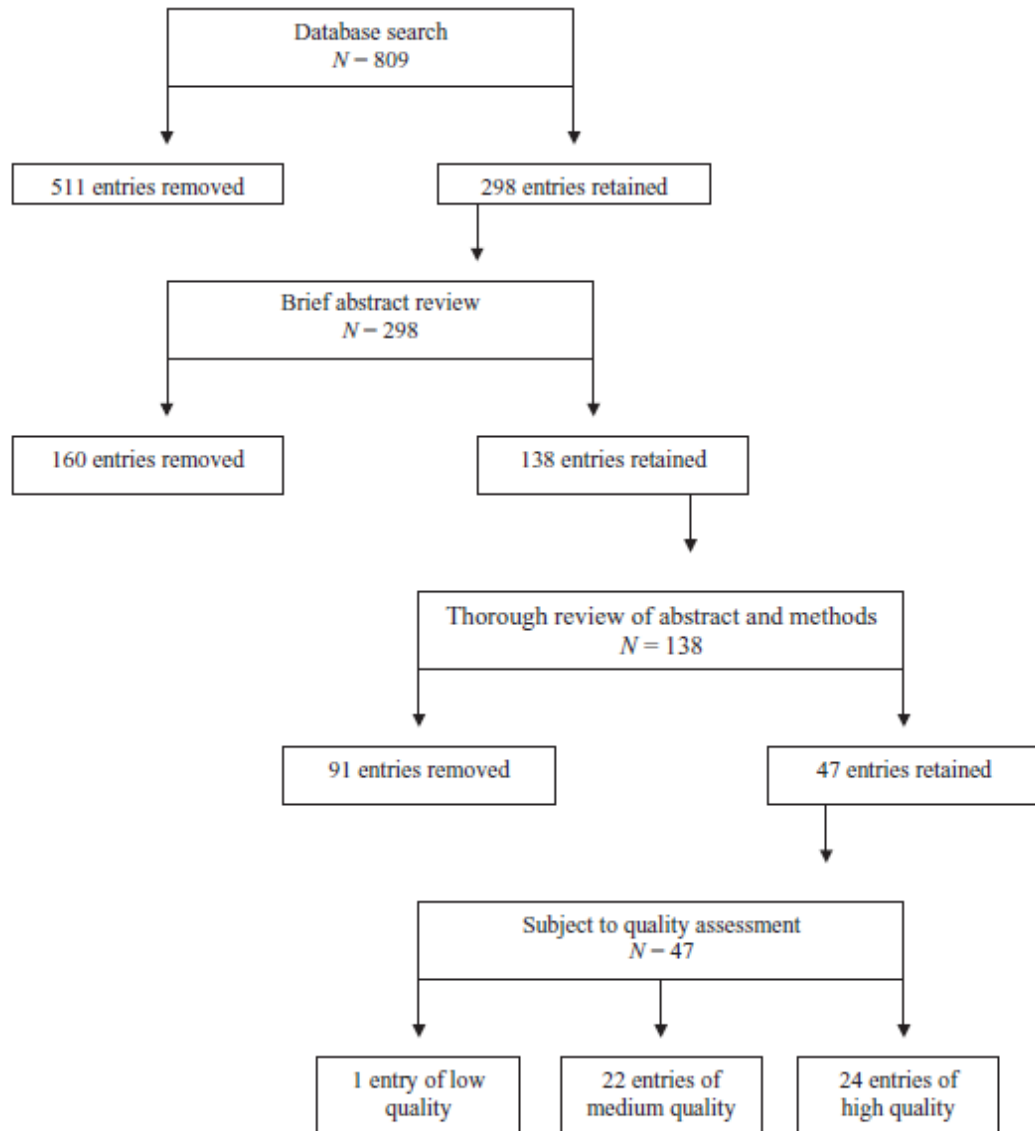
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                    └─────────────────────┘
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          │ 511 entries      │   │ 298 entries retained │
          │ removed          │   │                      │
          └──────────────────┘   └──────────────────────┘
                    ┌─────────────────────┐
                    │ Brief abstract      │
                    │ review   N ‒ 298    │
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          │ 160 entries      │   │ 138 entries retained │
          │ removed          │   │                      │
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             │ Thorough review of abstract and methods   │
             │              N = 138                       │
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          │ 91 entries       │   │ 47 entries retained  │
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     │ 1 entry of   │  │ 22 entries of    │  │ 24 entries of    │
     │ low quality  │  │ medium quality   │  │ high quality     │
     └──────────────┘  └──────────────────┘  └──────────────────┘
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FIGURE 1

Literature review process and decisions.

TABLE 3

Study Characteristics

Author/s; country; section; quality	Data source and sample size	Main measures	Treatment group/Patient comparisons	Control group	Time off work at intake	Length of follow up	Significant findings[*]
Chibnall & Tait (2009); US; LBP; Retrospective (High)	Missouri Workers Compensation LBP claimants ($N = 374$)	Employment status, disability	African American ($n = 171$); Caucasian ($N = 203$)	—	20.7 months	6 years	African American (ES $= .26$), and older age (ES $= .032$) hindered employment. African American (ES $= .38$), and higher WC (ES $= .14$) promoted social security disability insurance. Gender (NS).
Feuerstein et al. (2001); US; LBP; Retrospective (High)	Soldiers at risk for LBP ($N = 244$)	Limited duty and lost time	Soldiers with LBP claim in the past year	172 age-matched soldiers, no history of LBP	N/A	N/A	Risk factors of limited duty: Female gender (ES $= 1.04$), higher education (ES $= .71$), longer service (ES $= .14$), low aerobic exercise (ES $= .82$), lack of support (ES $= .77$), and perceived effort (ES $= .22$). Age (NS) Protective factors: Innovation (ES $= .15$), involvement (ES $= .12$), and supervisor support (ES $= .14$).
Fritz et al. (2002); US; LBP; Rehabilitation (High)	Acute LBP patients ($N = 78$; 41 intervention, 37 standard treatment)	RTW	Patients placed into (a) manipulation with range-of-motion exercises; (b) end-range exercises; (c) spinal stabilisation; (d) traction	Standard physical therapy (low stress aerobics and muscle reconditioning)	> 3 weeks	4 weeks	Low pain (ES $= .19$), depression (ES $= .23$), anxiety (ES $= .20$), and greater physical activity (ES $= .20$) promoted RTW; intervention promoted RTW (ES $= .21$); reductions in fear avoidance explained this effect.
Gauthier et al. (2006); Canada; LBP; Rehabilitation (High)	WC Board of Nova Scotia claimants ($N = 255$)	RTW	10-week community-based cognitive behavioural intervention	—	$M = 30.7$ weeks	4 weeks	Male gender (ES $= .38$), pain catastrophising (ES $= .35$), and pain severity (ES $= .24$) promoted RTW. Age (NS); Depression (NS).
Heymans et al. (2009); the Netherlands; LBP; Rehabilitation (High)	Prospective study with data from three RCTs on LBP ($N = 628$)	Returning to equal waged employment	Trial 1: Behavioural oriented graded activity ($n = 134$); Trial 2: Workplace intervention and graded activity ($n = 195$); Trial 3: High and low intensity back schools ($n = 299$)	Usual LBP care	> 8 weeks	6 months	577 patients RTW after 12 months. Poor job satisfaction (ES $= .29$), high fear avoidance (ES $= .01$), high pain intensity (ES $= .034$), and female gender (ES $= .08$) hindered RTW.
Kapoor et al. (2006); US; LBP; Retrospective (High)	Acute LBP claimants New England ($N = 300$)	RTW	Compared employees who RTW ($n = 202$) to modified duty ($n = 21$) with non-RTW ($n = 51$)	—	—	3 months	Positive expectations (ES $= .49$), and high clinician expectations (ES $= .56$) promoted RTW.

Study	Sample	Outcome	Comparison		Time	Follow-up	Findings
Kool, Oesch, & DeBie (2002); Switzerland; LBP; Longitudinal (High)	Longitudinal study of chronic LBP patients (N = 99; 84 males)	RTW		—	26 weeks	1 year	High pain rating (ES = .75), low step test for aerobic capacity (ES = .58), low pseudo strength test (ES = .41), and having 3/5 behavioural signs of LBP (ES = .56) hindered RTW. Gender (NS).
Krause et al. (2001); US; LBP; Retrospective (High)	LBP cases drawn from a large WC carrier in California (N = 433)	RTW interval during acute and subacute chronic disability phases	LBP claimants (433 acute and 214 chronic)	—	Approx. 30 days	1–3.7 years after date of injury	Increasing age (ES = .12 per decade), high Job strain (ES = .20), low supervisor support (.11), and a high workload (e.g., heavy lifting; ES = .14) hindered RTW. Low schedule flexibility (ES = .19) hindered RTW only during acute phase of injury.
Soucy, Truchon, & Cote (2006); Canada; LBP; Retrospective (High)	LBP injury claimants from WCB in Quebec (N = 258)	Non-RTW	Compared LBP patients who returned to work (n = 114) with those who did not (n = 144)	—	2–9 weeks	6 months	Male gender (ES = .46), fears/beliefs about work (ES = .55), work stress (ES = .45), and worrying about work (ES = .59) hindered RTW. Age, workplace support, decision latitude and psychological demands were not significant.
Turner et al. (2008); US; LBP; Retrospective (High)	Workers with LBP claims in Washington State (N = 1,885)	RTW	Compared LBP patients who did RTW (n = 261) with those who did not (n = 1,624)	—	3 weeks	1 year	In a fully adjusted model, job accommodations (ES = .15), lower initial disability score (ES = 1.07), low pain catastrophising (ES = .48), high recovery expectation (ES = .31), low fear avoidance (ES = .44), and good mental health (ES = .44) promoted RTW. Age (NS), Gender (NS), Education (NS).
Bartys, Burton, & Main (2005); UK; MSD; Longitudinal (High)	Large pharmaceutical company in UK (N = 4,637)	Psychosocial risk factors predicting MSD	Compared employees who used MSD-related absence (n = 219) with those who did not	—	0 days	15 months	Psychosocial risk factors of MSD related absences were: psychological distress (ES = .26), job dissatisfaction (ES = .64), low social support (ES = .46), workplace causal attribution (ES = .41), low control at work (ES = .32), and organisational climate (pressure at work; ES = .46). These risk factors had an additive effect.
Marois & Durand (2009); Canada; MSD; Rehabilitation (High)	Patients of PREVICAP work rehabilitation program, Quebec (N = 222)	RTW	An interdisciplinary program spanning 12 weeks: (a) diagnostic interview; (b) preparation for RTW, and (c) therapeutic RTW	—	Avg. 31.7 weeks	12 weeks	Diagnostic labelling (ES = .49), fear of re-aggravation (ES = .57), unavailability of light duties (ES = .72), and awkward and prolonged static postures (ES = .56) promoted RTW. Shorter tenure (ES = .49), perceptions of therapeutic failure (ES = .61), and being male (ES = .61) hindered RTW.

TABLE 3

Continued

Author/s; country; section; quality	Data source and sample size	Main measures	Treatment group/Patient comparisons	Control group	Time off work at intake	Length of follow up	Significant findings[*]
Sullivan et al. (2005); Canada; MSD; Rehabilitation (High)	MSD WCB of Nova Scotia claimants who had been off work for 2 years or less (N = 215)	Psychosocial factors of RTW	Compared RTW rates among patients who did complete a full 10-week treatment (N = 181) with those who did not (N = 34)	—	M = 28.8 weeks	4 weeks	The intervention program (ES = .11), male gender (ES = .28), low kinesiophobia (ES = .30), low pain disability index (ES = .22), reductions in pain catastrophising (ES = 1.01), and low scores on McGill Pain Questionnaire (ES = .47) promoted RTW.
van Duijn et al. (2005); the Netherlands; MSD; Retrospective (High)	Large occupational health service (N = 164)	Modified duty and RTW	Compared patients who performed modified duties (n = 65) with those who did not (n = 99)	—	2–6 weeks	1 year	Predictors of modified work were infrequent lifting at work (ES = 1.01), positive colleague relationships (ES = .68), good mental health (ES = .35), prolonged periods of standing (ES = .91), and less skill discretion (ES = .12). Age (NS), Gender (NS). Tenure (ES = .19), chronic health complaints (ES = .26), pain intensity (ES = .04), and disability (ES = .06) predicted prolonged sick leave. Good quality of life (ES = .03) predicted shorter sickness.
Mayer, Gatchel, & Evans (2001); US; SCI; Longitudinal (High)	Chronically disabling spinal disorder patients (N = 1,052)	RTW following tertiary rehabilitation	Separated and compared patients across five age groups (< 25, 25–34, 35–44, 45–54, and > 55)	—	Min. 4 months of disability	1 year	RTW rate (ES = .20), and 1-year work retention (ES = .25) was lower with increasing age. Older workers were more likely to return to the same employer (ES = .22).
Adams et al. (2007); Canada; Whiplash; Rehabilitation (High)	Age- and sex-matched patients who underwent 10-week intervention (N = 75)	Responsiveness to community-based psychosocial intervention	Individuals classified by pain chronicity as subacute (4–12 weeks), early chronic (3–6 months), or chronic (> 6 months)	—	Dependent on group classified	4 weeks	Subacute patients and early chronic patients were more than twice as likely to RTW. Not enough information to calculate ES.
Sullivan et al. (2006); Canada; Whiplash; Prospective; (High)	Psychosocial intervention patients (N = 130 matched on psychosocial risk factors)	RTW following rehabilitation	70 patients enrolled in 10-week Progressive Goal Attainment Program (PGAP) + physical therapy program	Functional restoration physical therapy program (N = 60)	Approx. 30 weeks	4 weeks	Addition of PGAP (ES = .55), shorter absence before study (ES = 1.13), and reductions in pain catastrophising promoted RTW (ES = .55). The addition of PGAP reduced pain catastrophising (ES = 3.27). Age (NS), Gender (NS).

Study	Source	Dependent variable	Comparison		Baseline	Follow-up	Findings
Kaye (2009); US; Physical and mental; Retrospective (High)	American Community Survey (N = 1.4 million)	Disability status	Compared disability rate across disability types and occupations	N/A	N/A	None	Disability rate was higher for entry-level occupations (ES = .24) Education (ES = .45), and younger age (ES = .01) were markers of reduced disability. Gender (NS).
Pilling (2002); US; Physical and mental; Longitudinal (High)	National Child Developmental Study: 33-year longitudinal study (N = 9,711)	Educational, vocational and earnings	Compared the physically disabled (n = 346), the mentally ill (n = 42), and no disability counterparts (n = 9,323)	—	N/A	33 years; onset of disability not given	Disabled individuals were less likely to be employed (ES = .12) and earned wages in the lowest fifth percentile (ES = .22). Employment was lower among the disabled with above average (ES = .10) and below average qualifications (ES = .11). Severe physical disability hindered employment (ES = 18).
Didie et al. (2008); US; Mental disabilities; Retrospective (High)	Adults with DSM-IV criteria for body-dysmorphic disorder (N = 141)	Employment status	Compared employed (n = 74) with unemployed (n = 55) patients	—	—	—	Lower education (ES = .34), female gender (ES = .17), higher depression scores (ES = 1.15), greater symptom severity (ES = .61), lower social functioning (ES = .86), and number of current comorbid disorders (ES = .83) hindered employment. Age (NS).
Smith & Arnett (2005); US; Multiple sclerosis; Retrospective (High)	Multiple-sclerosis patients (N = 50)	Work status	Compared those working full-time (n = 19), those working part-time (n = 10), those unemployed (n = 21)	—	—	—	The unemployed were less educated (ES = 3.32), not as depressed (ES = 1.52), and experienced greater fatigue (ES = 3.94) and disability (ES = 6.04) Employment status did not vary by age, gender, IQ, disease duration, cognitive functioning, or diagnosis duration.
Glozier et al. (2008); New Zealand; Stroke; Prospective (High)	Prospective, population-based stroke study (N = 210)	RTW	Compared patients returning to paid employment (N = 112) with those who did not (N = 98) using models adjusted by age and gender	—	Time of stroke (day 0)	6 months	Risk factors of unemployment were psychiatric morbidity (depression; ES = .52), part-time employment before stroke (ES = .56), non-NZ/European ethnicity (ES = .51), and functional limitations following stroke (ES = .71). Age (NS), Gender (NS).
Ownsworth & Shum (2008); Australia; Stroke; Prospective (High)	Hospital and community rehabilitation centres Brisbane, Queensland (N = 27)	RTW and productivity	Compared those who made a RTW (n = 10) with those who did not (n = 17)	—	Avg. 1.1 years post stroke	12 months	Duration since disability (ES = 1.26) and poor executive functioning (ES = .94) hindered employment. Employment status did not vary by age, education, or gender. Functional status (ES = 1.39), purposive behaviour (ES = .82), and time since stroke (ES = .50) were predictors of post stroke productivity.

TABLE 3

Continued

Author/s; country; section; quality	Data source and sample size	Main measures	Treatment group/Patient comparisons	Control group	Time off work at intake	Length of follow up	Significant findings[*]
Odegard et al. (2005); Norway; Rheumatoid arthritis Prospective (High)	Patients selected from the Oslo RA registry (N = 224)	Work disability	Compared 63 RA patients working at baseline and disabled at follow up with 96 RA patients in work at baseline and follow up	—	N/A	7 years	High education (ES = .51), and younger age (ES = .44) reduced the likelihood of disability. Risk factors were female gender (ES = .61), physical disability (ES = .75), and feelings of helplessness (ES = .61).
Anema et al. (2009) International; LBP; Retrospective (Medium)	Six international cohort studies of LBP (N = 2,825)	Work disability, RTW	Compared LBP across six countries	Standard care	3 months	1 and 2 years	1,156 out of 2,825 claimants (41.3%) RTW. The absence of comorbid health concerns (ES = .23), low pain intensity (ES = .03), longer tenure (ES = .01), work ability at time of injury (ES = .07), low job demands (ES = .12), and low job strain (ES = .14) promoted RTW. Pain medication (ES = .22), exercise therapy (ES = .11), work adaptation (ES = .27), job redesign (ES = .31), and therapeutic work resumption (ES = .24) were effective interventions.
Anema et al. (2002); the Netherlands; LBP; Rehabilitation (Medium)	300 occupational physicians overseeing 467 LBP patients	RTW	N/A	N/A	3–4 months	2 years	According to occupation physicians, a long clinical wait-period (ES = .44), and a passive/non-cooperative disposition (ES = .67) hindered RTW. Mental blocks and lack of job motivation were hindrances only in univariate analysis.
Kaiser et al. (2001); Sweden; LBP and others; Retrospective (Medium)	Social Insurance Office claimants (N = 372)	Vocation rehabilitation	Logistic regression comparing those with and without psychosocial markers	—	—	3 years after rehab.	Older age (ES = .07) predicted disability pension among men. Older age (ES = .07) and the presence of psychosocial markers (ES = .81) predicted disability pension among women.
Gatchel, Mayer, & Theodore (2006); US; MSD; Rehabilitation (Medium)	Tertiary rehabilitation program at the Institute of Dallas Ergonomics (N = 150)	RTW and disability duration	Categorised pain disability of patients as mild (n = 22), severe (n = 67), or extreme (n = 61)	—	More than 4 months	1 year	Length of disability increased with increasing pain (ES = .69). Patients with mild pain disability were more likely to RTW (ES = .96), and retain that work (ES = 1.47).

Arango-Lasprilla et al. (2009); US; SCI Retrospective (Medium)	National Spinal Cord Injury Statistical Center patients (N = 11,424)	Employment status	Compared employment status for Hispanic (n = 1,369) and Caucasian (n = 10,055)	—	Not given (time of SCI claim)	1 year	Caucasian ethnicity (ES = .34), younger age (ES = .01), unmarried (ES = .14), higher education (ES = .70), employment at admission (ES = .80), and a lower spinal injury impairment classification (ES = .25) promoted employment. Gender (NS).
Baltov et al. (2008); Canada; Whiplash; Rehabilitation (Medium)	Rehabilitation program for chronic whiplash (N = 28)	RTW, and psychological distress	Program elements: behaviour therapy, support, and occupational therapists visits	—	Min. of 12 weeks prior to entering program	Baseline (7 weeks) and 3 months	Social support (ES = .27) promoted RTW.
De Kesel et al. (2008); Belgium; Carpel Tunnel; Retrospective (Medium)	Employer medical reports (N = 88; 20 male)	RTW	Patients underwent open or endoscopic surgery	—	Min. of 1 month	Duration until RTW	Having diabetes (ES = 1.71), being self-employed (ES = .54), the lack of repetitive movements (ES = .37), light lifting (ES = .47), and non-manual work (ES = .50) promoted RTW.
Katz et al. (1997); US; Carpel tunnel; Longitudinal (Medium)	Prospective community-based study (N = 135)	RTW.	Patients underwent surgery for CTS (not specified). Compared those who made a RTW at 6 months (n = 104) with those who did not (n = 31)	—	Min. of 1 month	6 months following surgery	Pre-operative WC cases (ES = .96), pre-operative CTS related absences (ES = .71), poor mental health (ES = .71), high symptom severity (ES = 1.49), and scar tenderness (ES = .30) hindered RTW. Gender and education were marginally significant.
Palmer et al. (2005); UK; Surgery; Prospective (Medium)	Questionnaires given to patients from a hospital (N = 278)	Job loss following hip or knee replacement	Compared those who left their jobs due to the surgery (n = 74), those who left for another reason (n = 78) and those who retained employment (n = 105)	—	Operation waitlist 4–9 months	Median interval since job loss 3.5 (range 0.8–6.5) years	Duration of symptoms (ES = .22), current disability (ES = .29), and small organisation size (staff < 10; ES = 1.62) were risk factors for leaving job. Age (NS), Gender (NS).
Post et al. (2006); the Netherlands; Surgery; Retrospective (Medium)	University medical centre Groningen surgical patients. (N = 53; 43 male)	RTW, level of disability, and quality of life	Compared those scoring disabled on the Sickness Impact Profile (n = 29) with those who did not (n = 24)	—	Avg. hospital stay 25 days	Avg. of 1.5 years	Older age, expressed in one year increments, predicted disability (ES = .04).
Sahota et al. (2006); US; Surgery; Prospective (Medium)	Southern California hospital patients mailed questionnaires (N = 105)	Employment following liver transplant	Compared those who were unemployed (n = 39) with those who were employed (n = 38)	—	Time of transplant	1 year	Higher education (> high school; ES = .42), pre and post income (> $50,000; ES = .55) and the absence of prior disabilities (ES = .47) promoted employment following surgery.

TABLE 3

Continued

Author/s; country; section; quality	Data source and sample size	Main measures	Treatment group/Patient comparisons	Control group	Time off work at intake	Length of follow up	Significant findings[*]
Dyster-Aas et al. (2004); Sweden; Burn; Longitudinal (Medium)	Uppsala Burn Unit ($N = 86$)	Long-term health and work status	Compared those working ($n = 71$) with those not working ($n = 15$)	—	Length of stay at hospital more than 7 days	Avg. of 9 years	Younger age (ES = .51), shorter hospital stay (ES = .43), lower body surface area burn (ES = .45), higher body image (ES = .56), better affect (ES = .86), better interpersonal relationships (ES = .62), higher sexuality (ES = .46), and less pain (ES = .39) promoted employment.
Braden et al. (2008); US; Physical and mental; Retrospective (Medium)	Community tracking survey ($N = 5,328$)	Current work status; 12-month work history	Patients with mental health and comorbid chronic pain ($n = 695$) compared to those with mental health problems ($n = 333$) and those with chronic pain ($n = 1,605$).	Group with no mental disorders or chronic pain	N/A	N/A	A mental disorder with comorbid chronic pain was associated with unemployment in the past year (ES = .46) and sick days in past month (ES = .21). Older age (ES = .05), female gender (ES = .59), lower education (ES = .28), and marriage (ES = .20) hindered employment.
Dutta et al. (2008); US; Physical and mental; Retrospective (Medium)	Department of Education, Rehabilitation Service Administration Reports ($N = 15,000$)	Competitive employment for 90 days following rehabilitation	Compared patients with sensory, physical, and mental disabilities	—	—	—	Counselling and guidance (ES = .09), university training (ES = .11), job search assistance (ES = .14), and monetary support (ES = .15) promoted employment. Minority status (ES = .32), and the provision of cash or medical benefits (ES = .26) hindered employment.
Henry et al. (2007); US; Physical and mental; Retrospective (Medium)	Adults in the Massachusetts medical buy-in program ($N = 1,093$)	Work status, and annual earnings above substantial gainful activity (SGA)	Compared physically disabled ($n = 356$), psychiatrically disabled ($n = 287$) and those with comorbid conditions ($n = 312$).	—	—	—	Mobility limitations were predictors of unemployment (ES = .70), and planning not to work (ES = .30). Comorbid conditions with mobility limitations indicator earning below SGA (ES = .66).
Sarda et al. (2009); Brazil and Australia Physical and mental; Prospective (Medium)	Pain clinics in Southern Brazil and Australia ($N = 622$)	Disability and work status	Compared Southern Brazilian sample ($n = 311$) with age-and gender-matched Australian sample ($n = 311$)	—	Min. 3 months	Not specified	Across countries, younger age (ES = .52), higher education (ES = .55), absence of physical disability (ES = .45), self-efficacy (ES = .51), and lower depression rating (ES = .51) promoted employment.

Study	Data source	Outcome	Comparison			Follow-up	Findings
Rosenheck et al. (2006); US; Mental disabilities; Retrospective (Medium)	The CATIE study that compared cost effectiveness of antipsychotic medications ($N = 1,257$).	Labour force participation among schizophrenics	Compared competitively employed ($n = 208$) with unemployed schizophrenics ($n = 1,049$)	—	—	N/A	Majority status (ES = .37), higher education (ES = .35), no public monetary support (ES = .55), higher cognitive functioning (ES = 1.06), and site availability for rehabilitation (ES = .14) promoted employment. Age (NS).
Salkever et al. (2003); US; Mental disabilities; Retrospective (Medium)	Records from 116 employers paying mental health claims for schizophrenia ($N = 407$)	RTW and duration of disability claims	Compared claimants who had made a RTW ($n = 25.06\%$) with those who had not	—	—	N/A	Short wait periods (ES = .06), younger age (ES = .03), low mental health deductibles (< \$600; ES = .76), company expansion (ES = .96), and the presence of formal grievance processes (ES = .47) promoted RTW. Factors promoting shorter claim duration were: job accommodation (ES = .02), large mental health benefit carve outs (ES = .32), absence of short-term disability (ES = .39), and supplementing WC benefits (ES = .22).
Wagner et al. (2000); US; Mental disabilities; Retrospective (Medium)	UNUM Life Insurance Company database ($N = 77,297$)	Progression of disability claims	Compared mentally disabled ($n = 6,035$) with physically disabled ($n = 71,262$).	—	—	N/A	Predictors for progression to long-term benefits were mental disability (ES = .28), older age (ES = .13), and female gender with mental disabilities (ES = .11).
Fowler et al. (1997); US; Neuromuscular; Retrospective (Medium)	Patients from hospitals in Sacramento and Chicago ($N = 154$)	Factors of employment and unem-ployment	—	—	—	—	High IQ (ES = .58), low depression score (ES = .50), self-acceptance (ES = .56), and communality (ES = .57) promoted employment
Roessler et al. (2004); US; Multiple sclerosis; Retrospective (Medium)	National survey conducted by the Multiple Sclerosis Society ($N = 1,310$; 274 male)	Employment status	Compared employed ($n = 563$) with unemployed ($n = 747$)	—	—	—	Benign symptoms (ES = .53), higher education (ES = .47), and the absence of cognitive symptoms (ES = .37) promoted employment
Carter et al. (2000); US; Stroke; Prospective (Medium)	Massachusetts General Hospital tertiary treatment program ($N = 182$)	RTW	Compared those who retained employment with those who did not	—	—	Avg. 2.75 years following treatment	Physical disability (ES = 1.69), depression (ES = 1.30), older age (ES = .61), and neurological impairment (ES = 1.29) hindered employment

Note: *All effect sizes are reported as Cohen's d. ES = effect size; LBP = low back pain; MSD = musculoskeletal disorder; RTW = return to work; SCI = spinal cord injury; WC = workers compensation.

Summary of Studies Included

Out of the 46 reviewed, 29 articles examined per- sons with physical disability (Adams, Ellis, Stanish, & Sullivan, 2007; Anema et al., 2009; Anema et al., 2003; Anema, Van Der Giezen, Buijs, & Van Mechelen, 2002; Arango-Lasprilla et al., 2009; Baltov, Cote, Truchon, Feldman, 2008; Bartys, Burton, & Main, 2005; Chibnall & Tait, 2009; De Kesel, Donceel, & De Smet, 2008; Dyster-Aas, Kildal, Willebrand, Gerdin, & Ekselius, 2004; Feuerstein, Berkowitz, Haufler, Lopez, & Huang, 2001; Fritz, George, Fritz, & George, 2002; Gauthier, Sullivan, Adams, Stanish, & Thibault, 2006; Heymans et al., 2009; Kaiser, Mattsson, Marklund, & Wimo, 2001; Kapoor, Shaw, Pransky, & Patterson, 2006; Katz et al., 1997; Kool, Oesch, & de Bie, 2002; Krause, Dasinger, Deegan, Rudolph, & Brand, 2001; Marois & Durand, 2009; Mayer, Gatchel, & Evans, 2001; Palmer, Milne, Poole, Cooper, & Coggon, 2005; Post, van der Sluis, & Ten Duis, 2006; Sahota et al., 2006; Soucy, Truchon, & Cote, 2006; Sullivan, Adams, Rhodenizer, & Stanish, 2006; Sullivan et al., 2005; Turner et al., 2008; van Duijn, Lotters, & Burdorf, 2005); 4 examined persons with mental disability (Didie, Menard, Stern, & Phillips, 2008; Rosenheck et al., 2006; Salkever, Shinogle, & Goldman, 2003; Wagner, Danczyk-Hawley, & Reid, 2000); 7 articles examined persons with chronic disability (Carter, Buckley, Ferraro, Rordorf, & Ogilvy, 2000; Fowler et al., 1997; Glozier, Hackett, Parag, & Anderson, 2008; Odegard, Finset, Kvien, Mowinckel, & Uhlig, 2005; Ownsworth & Shum, 2008; Roessler, Rumrill, & Fitzgerald, 2004; Smith & Arnett, 2005); and 6 articles concurrently examined persons with physical and mental disabilities (Braden, Zhang, Zimmerman, & Sullivan, 2008; Dutta, Gervey, Chan, Chou, & Ditchman, 2008; Henry, Banks, Clark, & Himmel- stein, 2007; Kaye, 2009; Pilling, 2002; Sarda, Nicholas, Asghari, & Pimenta, 2009).

There were 12 retrospective reports, nine rehabilitation programs, and eight prospective/longitudinal de- signs among the 29 articles reporting on persons with physical disability. All four articles reporting persons with mental disability were retrospective reports. There were three retrospective reports, and four prospective/longitudinal designs among the seven articles assessing person with chronic disability. Finally, there were four retrospective reports, and two prospective/longitudinal designs among the six articles that concurrently examined persons with physical and mental disability. Twenty-three studies were conducted in the United States (US), seven in Canada, four in the Netherlands, three in the United Kingdom (UK), two in Australia, two in Sweden, one in Belgium, one in New Zealand, one in Norway, one in Switzerland, and one international study. See Table 3 for details about each of the 46 studies.

The duration that an employee had been absent from work at study intake can also be found in Table 3. Five studies tracked the etiology of disability longitudinally making time off work at intake not

applicable. Time off work at intake for the remaining 42 articles was highly variable and in 13 cases was not reported. Among the 28 studies reporting, time off work at study intake varied between 0 days (time of injury) and 20.7 months with an average duration off work of 4.17 months (SD = 4.71). Follow-up intervals were also far from consistent. Among the 33 studies reporting, follow-up interval ranged between one month and 9 years with an average of 18.35 months (SD = 23.42).

Populations used as treatment and comparison groups can be found in Table 3. Few studies carefully selected and used adequate comparison groups. While many studies compared patients who returned to work or retained employment to patients who did not, only five studies selected carefully matched control groups that were not persons with disability or who received different care.

Evidence Synthesis

With 46 high- and medium-quality studies distributed across three disability types, in most cases there were sufficient studies to assess the evidence for individual and organization influences of labour force participation. Less evidence was found that assessed societal and legal influences of labour participation. Findings from studies concurrently examining persons with physical and mental disability were used during the evidence synthesis of each disability.

Persons with Physical Disability

We first synthesised the evidence for labour force participation among persons with physical disability. The evidence for employment status, returning to work, and receiving disability insurance were aggregated unless in- consistencies were found among the three outcomes. Regarding individual influences, we found *strong evidence* for experiencing little pain (based on six high- quality and two medium-quality studies), low pain catastrophising (based on four high-quality studies), engaging in physical activity (based on three high-quality studies and two intervention components), and experiencing less disability (based on two high-quality and three medium-quality studies) increasing labour participation. We found *moderate evidence* for majority ethnic status (based on two high-quality and two medium- quality studies), higher education (based on two high- quality and five medium-quality studies), good mental health (based on two high-quality and one medium- quality study), and positive expectations (based on two high-quality studies) increasing labour participation. *Limited evidence* was found for not being married (based on two medium-quality studies), scoring low on measures of depression (based on two high-quality and one medium-quality study), and scoring low on measures of anxiety (based on one high-quality study) increasing

labour participation. *Mixed evidence* was found for age (based on seven high-quality studies and six medium- quality studies), and gender (based on seven high-quality studies and four medium-quality studies).

Regarding organization influences, we found *strong evidence* for supervisor support (based on four high- quality studies), a lack of job strain (based on three high-quality and one medium-quality study), a lack of work-related fear avoidance (based on three high- quality studies), and job tenure (based on three high- quality and one medium-quality study) increasing labour force participation. *Moderate evidence* was found for job satisfaction (based on two high-quality studies), and workplace accommodations (based on two high-quality studies) increasing labour force participations. *Limited evidence* was found for prolonged static postures at work (based on two high-quality studies and one medium-quality study) increasing labour force participation.

Regarding social influences, we found *moderate evidence* for high social support (based on two high- quality studies and one medium-quality study) increasing labour force participation. *Limited evidence* was found for the availability of benefits (based on two medium-quality studies), and shorter waitlist/duration until treatment (based on one high-quality study and two medium-quality studies) increasing labour force participation. *Mixed evidence* was found for the availability of workers compensation (based on one high-quality study and one medium-quality study).

Persons With Mental Disability

We synthesised the evidence for labour force participation among persons with mental disability. Regarding individual influences, we found *moderate evidence* for higher education (based on two high-quality studies and four moderate-quality studies), male gender (based on one high-quality study and three medium-quality studies), younger age (based on two high-quality contradictory studies and five medium-quality studies), and benign symptoms (based on two high-quality studies and one medium-quality study) increasing labour participation. We found *limited evidence* for majority ethnic status (based on two moderate-quality studies) increasing labour force participation.

With regard to organization influences, *limited evidence* was found for entry level employment (based on one high-quality study) increasing labour participation. *Insufficient/no evidence* was found for workplace accommodation (based on one medium-quality study), and having a formal grievance policy (based on one medium-quality study).

With regard to social influences, *limited evidence* was found for social support (based on one high- quality study and one medium-quality study), the availability of benefits (workers

compensation, medical, or low deductibles; based on three moderate- quality studies), and shorter waitlists/site availability (based on two moderate-quality studies) increasing labour participation. *Mixed evidence* was found for monetary support (based on two moderate-quality studies).

Persons With Chronic Disability

We synthesised the evidence for labour force participation among persons with chronic disability. Regarding individual influences, *strong evidence* was found for not experiencing a comorbid disability (based on three high-quality studies and one moderate quality study), and lower scores on depression and feelings of help- lessness (based on three high-quality studies and two medium-quality studies) increasing labour participation. *Moderate evidence* was found for higher education (based on two high-quality studies and two moderate quality studies) increasing labour force participation. *Limited evidence* was found for higher cognitive abilities (based on one high-quality study and two medium-quality studies) increasing labour force participation. *Mixed evidence* was found for age (based on four high-quality and one moderate-quality study), and gender (based on four high-quality studies). *Insufficient/no evidence* was found for IQ (based on one moderate-quality study), and self-acceptance (based on one moderate-quality study).

Regarding organization influences, *limited evidence* was found for pre-disability full-time work status (based on one high-quality study) increasing labour force participation.

Regarding social influences, *limited evidence* was found for time since onset of disability (based on one high-quality study), increasing labour force participation. *Insufficient/no evidence* was found for support/communality (based on one moderate-quality study).

Discussion

We sought to perform a comprehensive examination into the individual, organization, societal, and legal in- fluences that promote or hinder work participation among persons with disability. This systematic review assessed these four influences among persons with physical, mental, and chronic disability using best evidence synthesis. Of more than 800 articles identified, 46 articles were of medium to high quality and included in the current review.

We found *strong evidence* for individual and organization influences affecting labour participation among persons with physical disability. Experiencing less pain, lower pain catastrophising, less work-related fear avoidance, less job strain, less severe disability, and having job tenure, high supervisor support, and engaging in physical activity were influences strongly promoting labour participation. *Moderate evidence*

was found for individual, organization, and societal influences affecting labour participation. Being of ethnic majority, having higher education, good mental health, positive expectations about working, job satisfaction, workplace accommodations, and social support were moderate influences promoting labour participation. *Limited evidence* was found for several individual, organization, and societal influences of labour force participation. Being single, experiencing prolonged static postures at work, the availability of disability benefits, having a shorter waitlist/duration until treatment, and being free from depression and anxiety had a limited impact on promoting labour force participation. *Mixed evidence* was found for younger age and male gender that sometimes was found to promote labour participation but other times was found to be nonsignificant.

No strong influences were found for labour participation among persons with a mental disability. Only individual influences of higher education, male gen- der, younger age, and experiencing benign symptoms were moderate influences promoting labour participation. *Limited evidence* was found for individual, organization, and societal influences of labour participation. Being of majority ethnic status, having social support, availability of benefits, shorter waitlists/rehabilitation site availability, and working for entry level employment had a limited impact on labour force participation. *In- sufficient/no evidence* was found to evaluate organisation influences of workplace accommodation and having a grievance policy. *Mixed evidence* was found for monetary support which sometimes promoted labour participation but other times hindered it.

We found *strong evidence* that individual influences of being free from a comorbid disability, and scoring low on depression and feelings of hopelessness promoted labour participation among persons with a chronic disability. Only the individual influence of higher education was a moderate influence promoting labour force participation. *Limited evidence* was found for several in- dividual, organization and societal influences. Having higher cognitive abilities, full-time employment status before onset of disability, and a shorter duration since onset of disability had limited affect on labour force participation. *Mixed evidence* was found for younger age and male gender that sometimes promoted labour participations but other times was nonsignificant. Insufficient evidence was found to assess the influence of IQ, self- acceptance, and communality.

A great deal of research has been conducted examining the influences of labour participation among persons with physical disability. Many of these findings extend to a broad knowledge base pertaining to influences of labour force participation among persons with chronic disability. Less research has been conducted on the in- fluences of labour participation among persons with mental disability. Large scale investigations comparing the influences of labour force participation among persons with various disabilities would be of benefit.

Similarly, many studies reported individual and organization influences of labour participation with far

fewer studies adequately assessing societal and legal influences. Future research needs to move beyond individual and organizational influences and incorporate additional measures to assess the social and legal influences that promote or hinder labour participation among this demographic.

The influences of labour participation among persons with disabilities are multifactorial and biopsychosocial. Our suggestion is to seek a comprehensive multifactorial theoretical account of labour participation among persons with disabilities. We would offer the fear avoidance model of exaggerated pain perception (Vlaeyen & Linton, 2000) as a potential starting point. This model highlights the importance of the maladaptive coping mechanism of catastrophising that leads to fear of pain, which in turn leads to avoidance behaviour contributing to work disability. Pain is also strongly associated with two hindrances of labour participation in depression and anxiety (Von Korff & Simon, 1996). Additional individual factors along with organization, societal, and legal factors need to be accommodated into this model.

Recommendations

Our recommendations pertain to analytic and measurement issues related to labour force participation among persons with disabilities. In general, we found that the extant literature concerning labour force participation among persons with disabilities is limited making firm conclusions difficult. Initially, too few studies were avail- able to allow for cross-country comparisons. We would suggest that future studies into the influences of labour force participation undertake an international focus utilizing cross-country comparisons. Previous research has found that substantial cross-country differences exist in the self-reported rates of disability (Banks, Kapteyn, Smith, & Soest, 2004) in preferred interventions, and in eligibility criteria for benefits (Anema et al., 2009). However, additional research into the individual, organization, societal, and legal influences are needed.

Further, time between onset of disability and study implementation was variable and often not reported. Similarly, follow-up intervals assessing outcomes were far from consistent. Variability in study implementation and duration limits the interpretation of findings in two crucial ways. First, without having standard intervals between injury and study intake it is impossible to assess whether influences of labour participation are time sensitive. This is particularly important given that if a worker has not returned to work by six months postinjury the likelihood of developing a chronic dis- ability is substantial (Abenhaim & Suissa, 1987; Franche, Frank, & Krause, 2005). An earlier return to work can reduce the cycle of deconditioning and improve retention; a finding supported in the present review. Second, without standard follow-up intervals, it is difficult to determine the sustainability of effects or determine which results may have been significant had the

study duration been longer. We recommend a standard intake interval and standard follow-up durations to make results more directly comparable.

In addition, few studies used true control comparisons. Without the use of control groups as comparisons, it is difficult to assess whether labour force participation among persons with disabilities is a result of some other mediating variable not measured. Thus, we recommend a more careful consideration into what constitutes an adequate control group for future studies in this area.

Limitations of the Review

Selection bias may have occurred when choosing articles to be cited, this is a problem in systematic review methodologies. To minimise the potential selection bias we added a third review author, who acted as an independent evaluator to resolve disagreement between the other reviewers.

The search terms used in this study may not capture all individual, organization, societal, or legal influences of labour participation or all types of disabilities. A more thorough examination of specific influences of labour participation and disabilities may yield a different picture regarding labour participation among persons with disabilities. It should be noted here that the main strength of our review was its comprehensiveness. It included a wide range of study designs and disabilities. Our quality appraisal system also gave more weight to the quality of the execution of a study design than to the design itself.

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